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TM 11-983

WAR DEPARTMENT TECHNICAL MANUAL

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VIBRATOR POWER SUPPLY

PP-114/VRC-3

WAR DEPARTMENT 27 FEBRUARY 1945

V. bratton 3H6691-17

TECHNICAL MANUAL

VIBRATOR POWER SUPPLIES PP-114/VRC-3 AND PP-114A/VRC-3

CHANGES No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *27 September 1949*

TM 11-983, 27 February 1945, is changed as follows:

The title of the manual is changed to read:

VIBRATOR POWER SUPPLIES PP-114/VRC-3 AND PP-114A/VRC-3

PART ONE
INTRODUCTION

Note (Added). Vibrator Power Supply PP-114/VRC-3 and Vibrator Power Supply PP-114A/VRC-3 are similar units except for minor differences in the size, characteristics, and location of certain parts. Except where otherwise stated in this change, information contained in TM 11-983 applies to both Vibrator Power Supplies PP-114/VRC-3 and PP-114A/VRC-3.

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1. General

a. Vibrator Power Supply * * * output connections (fig. 6). Input connections are made by means of a cable permanently attached to two banana plugs mounted on the inside of the **case.** These plugs engage * * * case are assembled.

* * * * * * *

d. The power supply is shipped with a metal cover as shown in figure 2. The cover is used to **waterproof** the power supply **when it is not fastened to Radio Receiver and Transmitter BC-1000-( ).**

* * * * * * *

3. Technical Characteristics

* * * * * * *

c. CURRENT DRAIN. When operated within input voltage ranges shown above, the **maximum** current drain on the battery will be as follows:

* * * * * * *

Delete figure 2 and substitute the following:

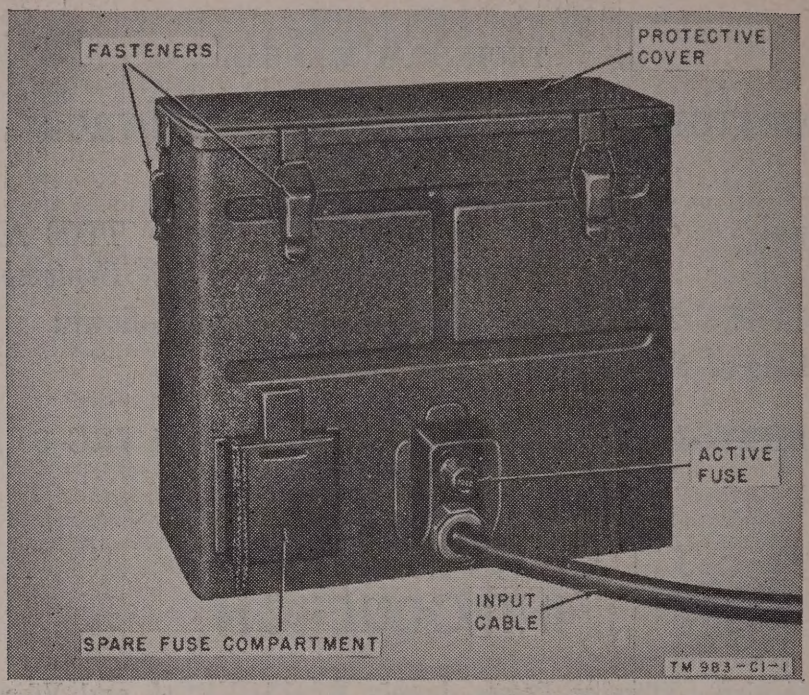

Figure 2. Vibrator power supply PP–114/VRC–3, backview.

6. Unpacking and Checking

a. Unpacking (Superseded).

(1) *Packing data.* Each equipment is completely assembled and placed in a corrugated carton. This carton is sealed in a moisture-vaporproof barrier. The equipment next is placed in a second corrugated carton which, in turn, is placed in a waterproof paper liner. This entire assembly finally is placed in a wooden packing case for export shipment.

(2) *Unpacking sequence.*

(*a*) Remove the steel straps from the wooden packing case; withdraw the nails that hold the cover in place and remove the cover.

(*b*) Lift the equipment out of the wooden case and carefully remove the waterproof liner and outer corrugated carton.

(*c*) Remove the moisture-vaporproof barrier and the inner corrugated carton.

(*d*) Remove the steel straps that hold the plywood protection blocks and remove the silica gel and cellulose wadding.

* * * * * * *

7. Connections and Interconnections

* * * * * * *

b. Connecting Power Supply to Radio Set.

(1) Remove the metal **waterproof** cover from the power supply.

* * * * * * *

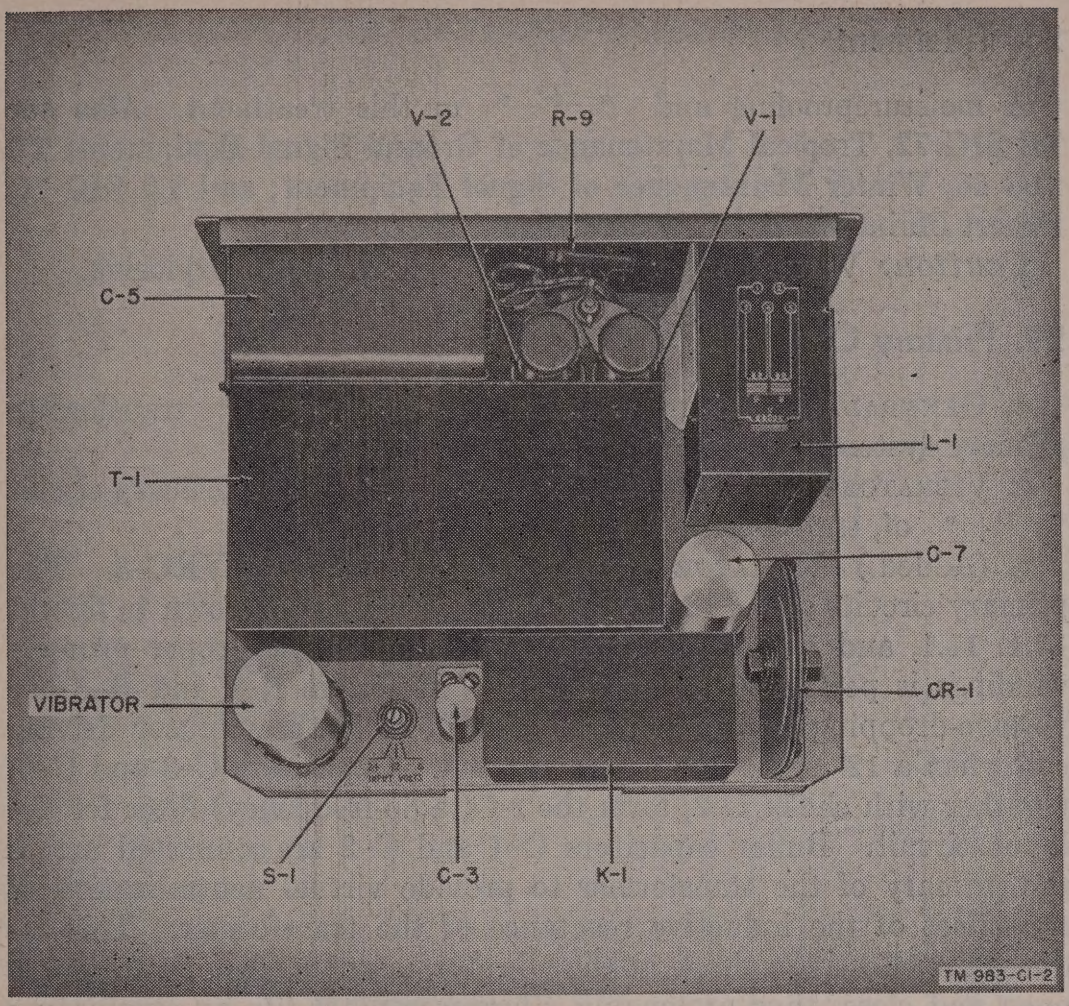

Figure 5.1 (added). Vibrator power supply PP-114A/VRC-3, top view of chassis.

Delete figure 6 and substitute the following:

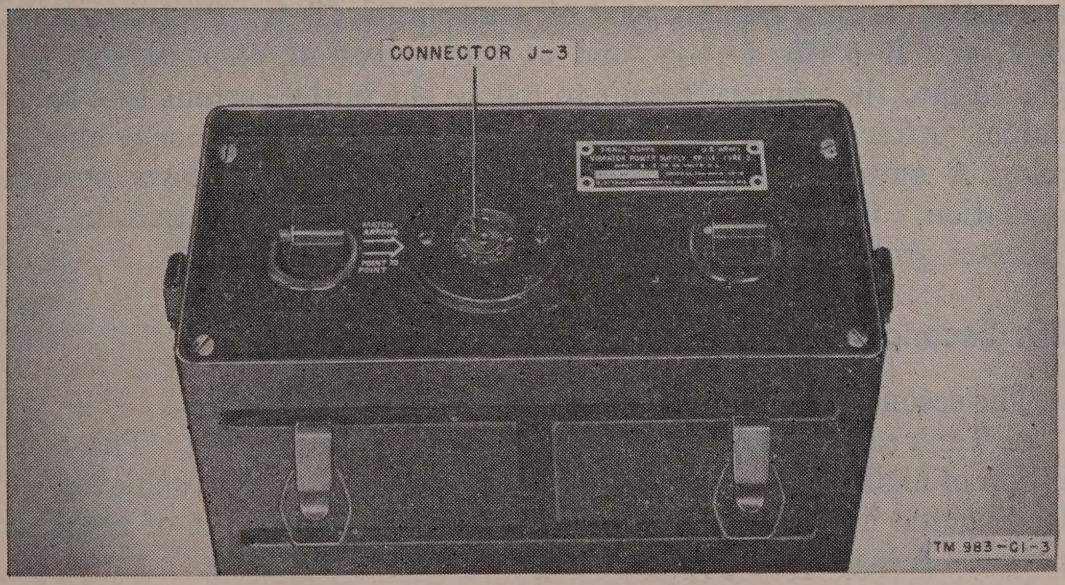

Figure 6. Vibrator power supply panel, showing connector

25. Treatment

A moistureproofing and * * * in this treatment. **Also see TB SIG 72, Tropical Maintenance of Ground Signal Equipment; TB SIG 66, Winter Maintenance of Signal Equipment; and TB SIG 75, Desert Maintenance of Ground Signal Equipment.**

Caution: Varnish spray may * * * be highly explosive.

29. Primary Circuit

a. GENERAL. Although Vibrator Power * * * transformer primary system.

b. VIBRATOR POWER SUPPLY PP–114/VRC–3. The primary circuit * * * of, transformer T–1.

c. (Added.) VIBRATOR POWER SUPPLY PP–114A/VRC–3. The primary circuits on 6-, 12-, and 24-volt operation are shown in figures 10.1, 11.1, and 12.1, respectively. Selection of the proper primary windings is performed by switch S–1. Resistors R–4 and R–5 are voltage-dropping resistors to provide 6 volts to the vibrator driving coil when a 12- or 24-volt supply is used. Capacitors C–3 and C–6, together with choke L–2, form the r-f (radio-frequency) filter for the input circuit. Buffer capacitors C–1 and C–2 are connected across the primary of the transformer to provide virtual neutralization of the effect of the inductive reactance of the transformer. This reduces the effective voltage at the vibrator contacts when the contacts open and close, thus prolonging vibrator contact life by eliminating electrolytic transfer (transfer of metal from one contact to another without necessarily arcing) and erosion. Air inductors A and B in primary transformer T–1 act as arc suppressors. These inductors are sealed within, and are part of, transformer T–1. Resistors R–8, R–7, and R–6 (for 6-, 12-, and 24-volt operation, respectively) are placed into the primary circuit to reduce the initial current to a safer value. After the vibrator has reached its proper frequency mode, relay A automatically bypasses these resistors and allows normal operation. Capacitor C–9 is used to reduce r-f radiation in the vibrator ground-return lead.

30. Secondary Circuit

The secondary circuits * * * of rated input.

a. Tank capacitor C–4 * * * in secondary voltage. This condition of high density in the secondary magnetic circuit is achieved by loading the high-voltage secondary with a large amount of reactive power. A high-quality, low * * * of the capacitor.

b. **In Vibrator Power Supply PP–114/VRC–3,** windings D2 and D3 (fig. 13) are bucking coils **in** the high-voltage secondary; windings H3 and H4 (fig. 14) are the low-voltage filament bucking coils. **In**

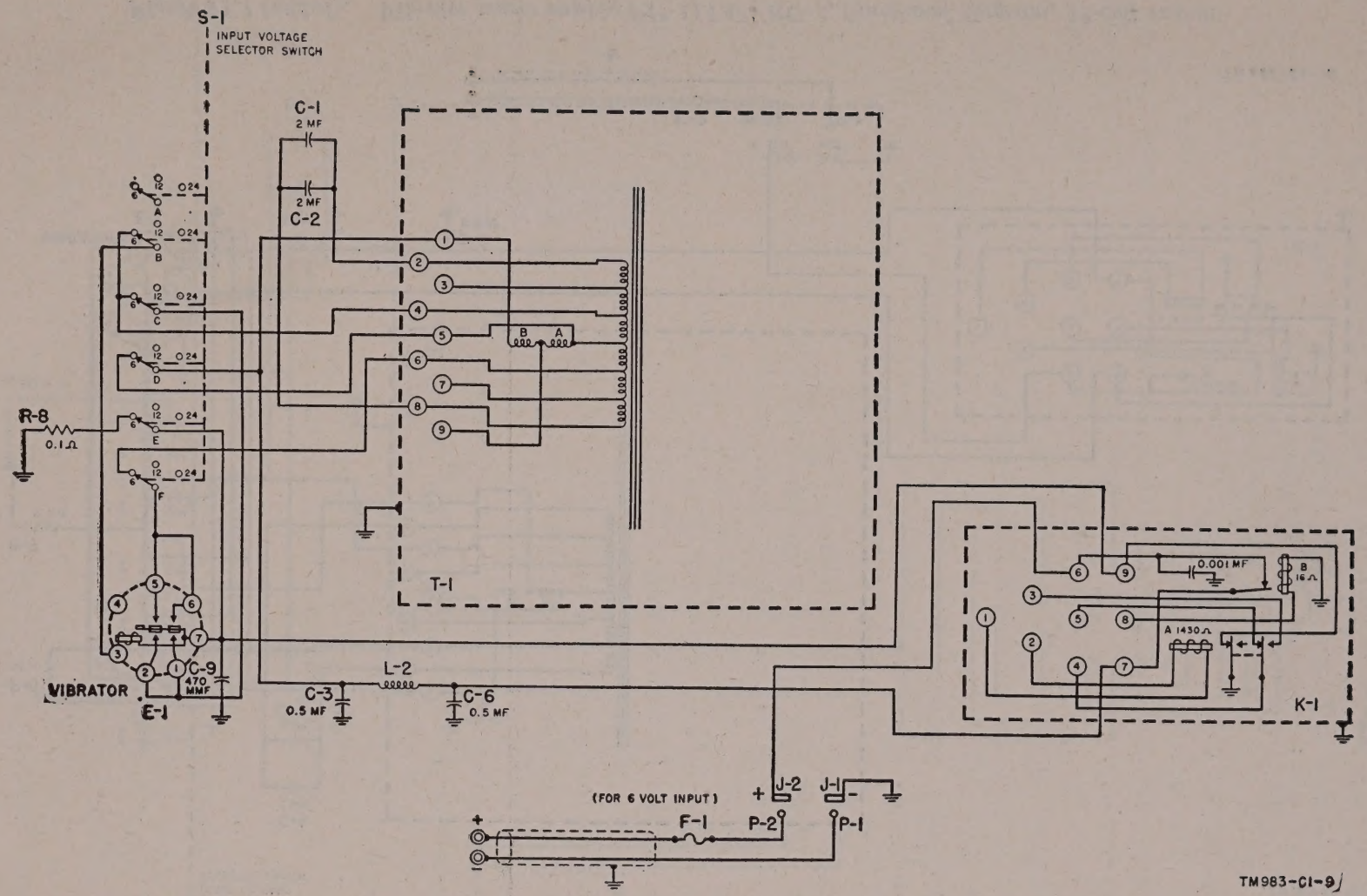

Figure 10.1 (added). Vibrator power supply PP–114A/VRC–3, functional diagram, 6-volt input.

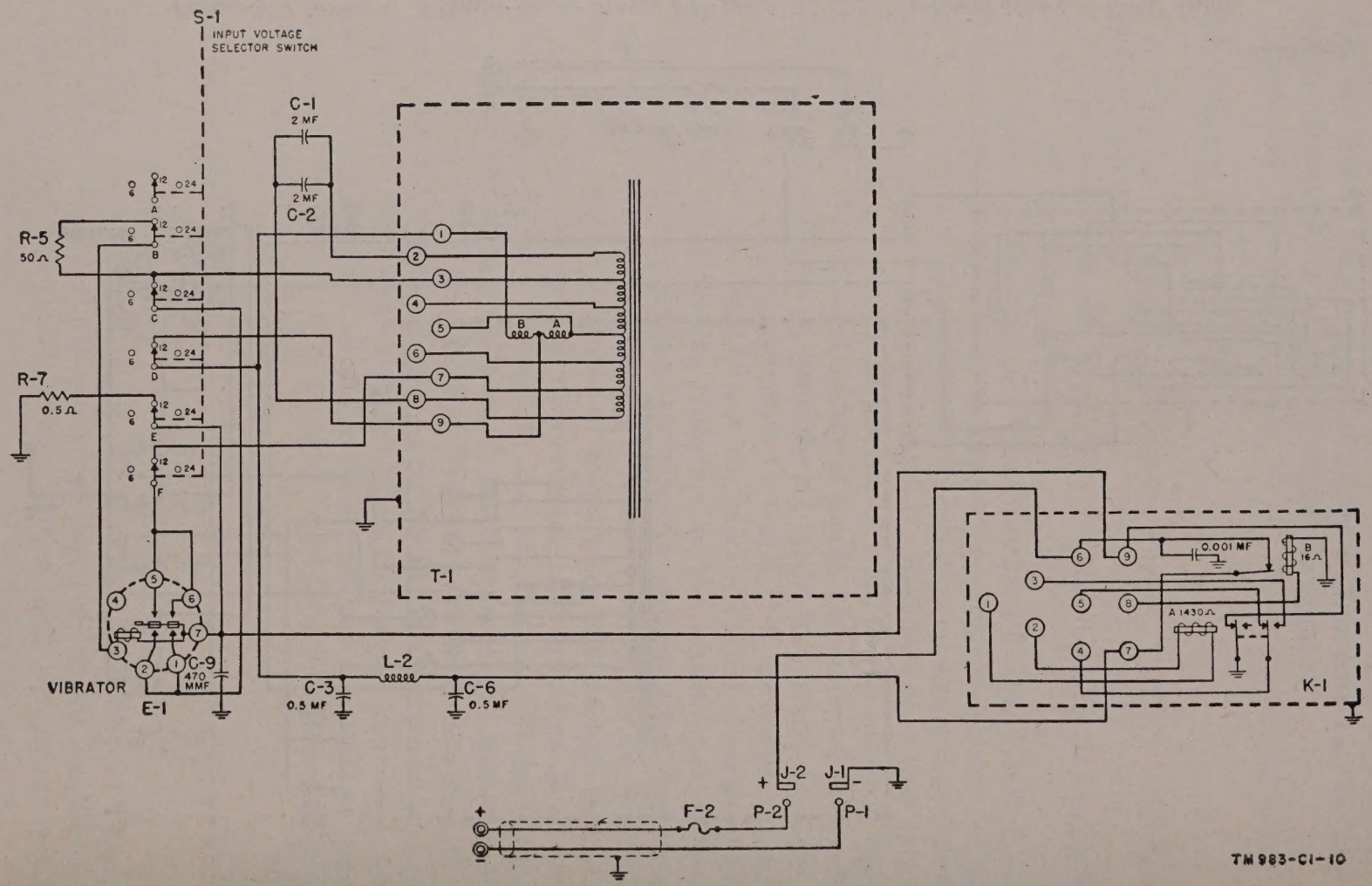

Figure 11.1 (added). Vibrator power supply PP–114A/VRC–3, functional diagram, 12-volt input.

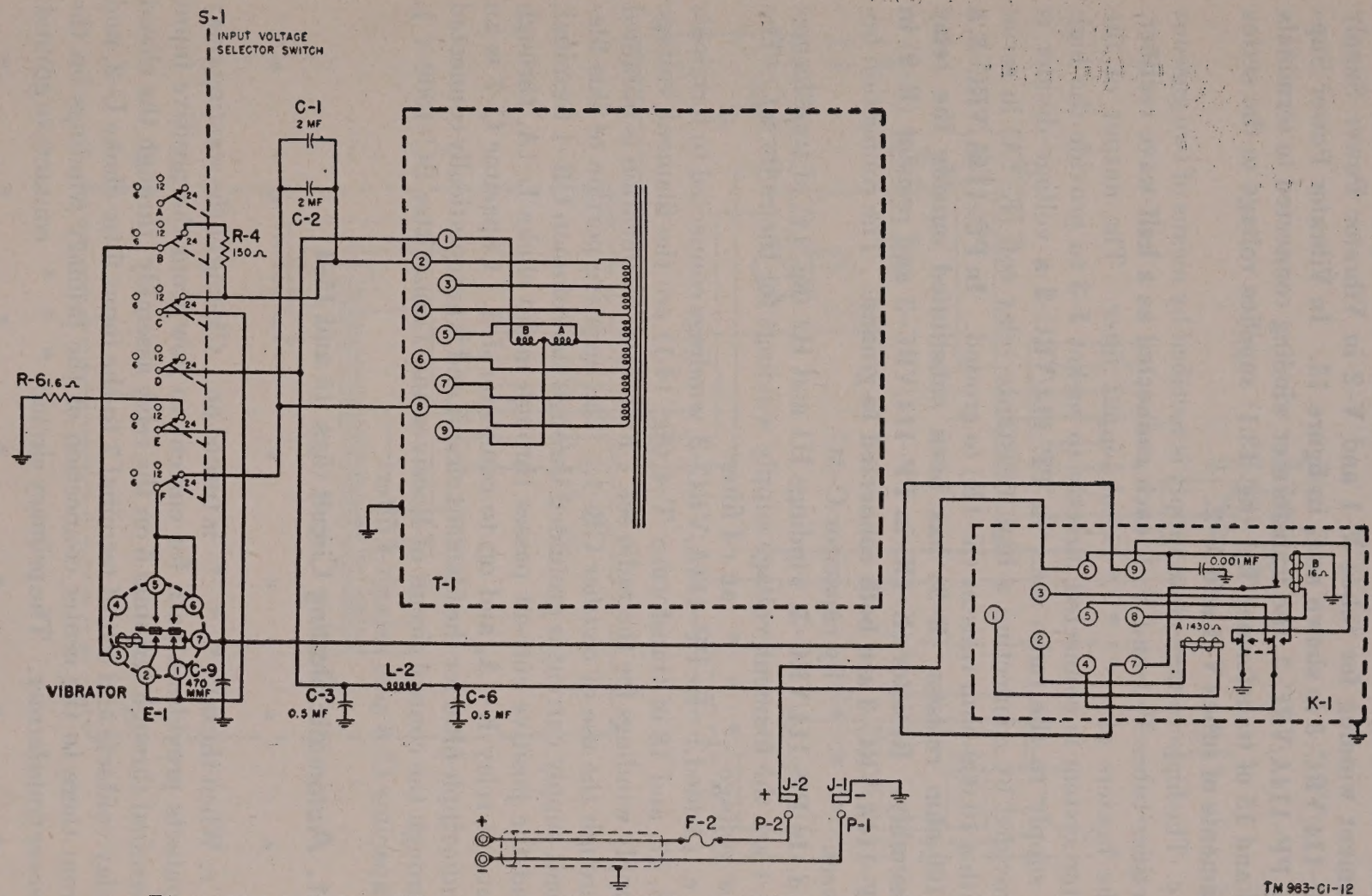

Figure 12.1 (added). Vibrator power supply PP–114A/VRC–3, functional diagram, 24-volt input.

Vibrator Power Supply PP–114A/VRC–3, the windings shown on the primary side of transformer T–1 in figures 13.1 and 14.1 are bucking coils. Bucking coils are * * * constant output voltage. **The filament winding for tubes V–1 and V–2 in Vibrator Power Supply PP–114/VRC–3 is shown as G in figure 13. In Vibrator Power Supply PP–114A/VRC–3, the transformer winding connected to terminals 14 and 15 of transformer T–1 (fig. 13.1) supplies voltage to the series filaments of tubes V–1 and V–2.**

c. The high-voltage plate supply is rectified by means of two gaseous rectifier tubes V–1 and V–2, **each connected as a half-wave rectifier.** The heaters of * * * choke-input filter. The output of the filter system is connected directly to socket **J–3** to provide the high B supply to the radio set. **In PP–114/VRC–3 a** voltage divider is provided by connecting a high resistance relay coil (K–1A) in series with a 10,000-ohm resistor (K–1R) to ground. **In PP–114A/VRC–3, a 9,100-ohm resistor (R–9) has been substituted outside the relay assembly. Resistor (K–1R) in PP–114/VRC–3 and resistor (R–9) in PP–114A/VRC–3 are both connected to ground.** The connection between * * * by capacitor C–5C.

d. **In PP–114/VRC–3,** windings H1 and H2 (fig. 14) of transformer T–1 are the filament voltage supply windings for the radio set. The low voltage * * * an r-f filter.

e. (Added.) In PP–114A/VRC–3, windings connected to terminals 16, 17, and 18 of transformer T–1 (fig. 14.1) are the filament voltage supply windings for the radio set. Full-wave rectification is obtained through the use of rectifier CR–1. The negative portion of this filament supply current is grounded through the common CR–1 terminal, and the positive current passes through audio choke L–1A, through cut-out relay K–1A, and on to connector J–3. Capacitor C–7 is an audio ripple filter for the filament circuit and is automatically connected through the control circuit of Receiver and Transmitter BC–1000–( ). Capacitor C–8 acts as an r-f filter.

31. Automatic Starting Circuit (figs. 15 and 15–1)

* * * * * * *

c. When the set * * * is turned on. Closing of the starting relay contacts provides a path for current to flow from the positive input terminal through terminal 6 on the relay assembly, through the closed relay contacts and out of terminal 7 to the input filter choke L–2, and from there to the center connection of the primary windings on the power transformer. The primary circuit * * * contacts to ground.

* * * * * * *

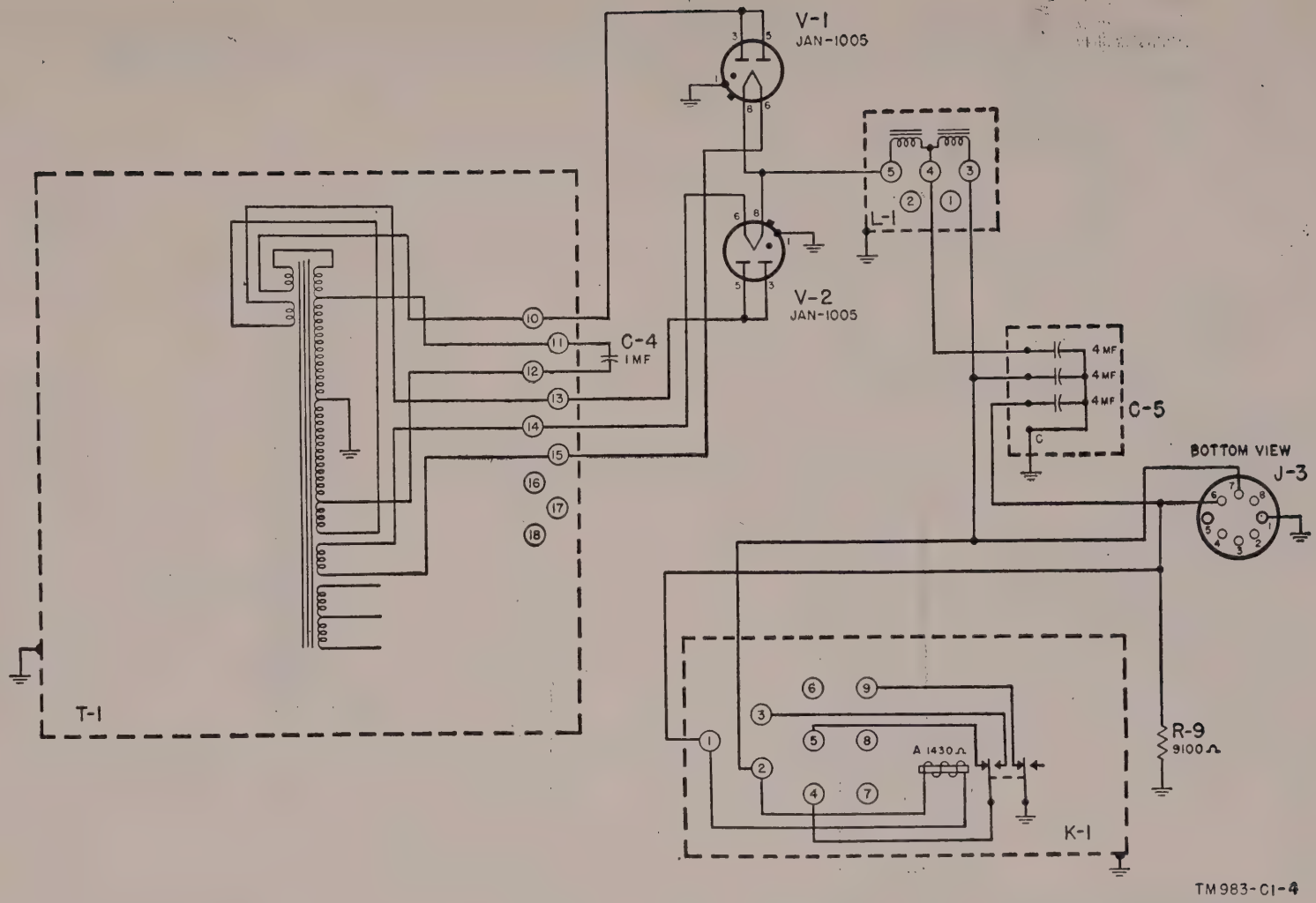

Figure 13.1 (added). Vibrator Power Supply PP–114A/VRC–3, high-voltage output circuit, functional diagram.

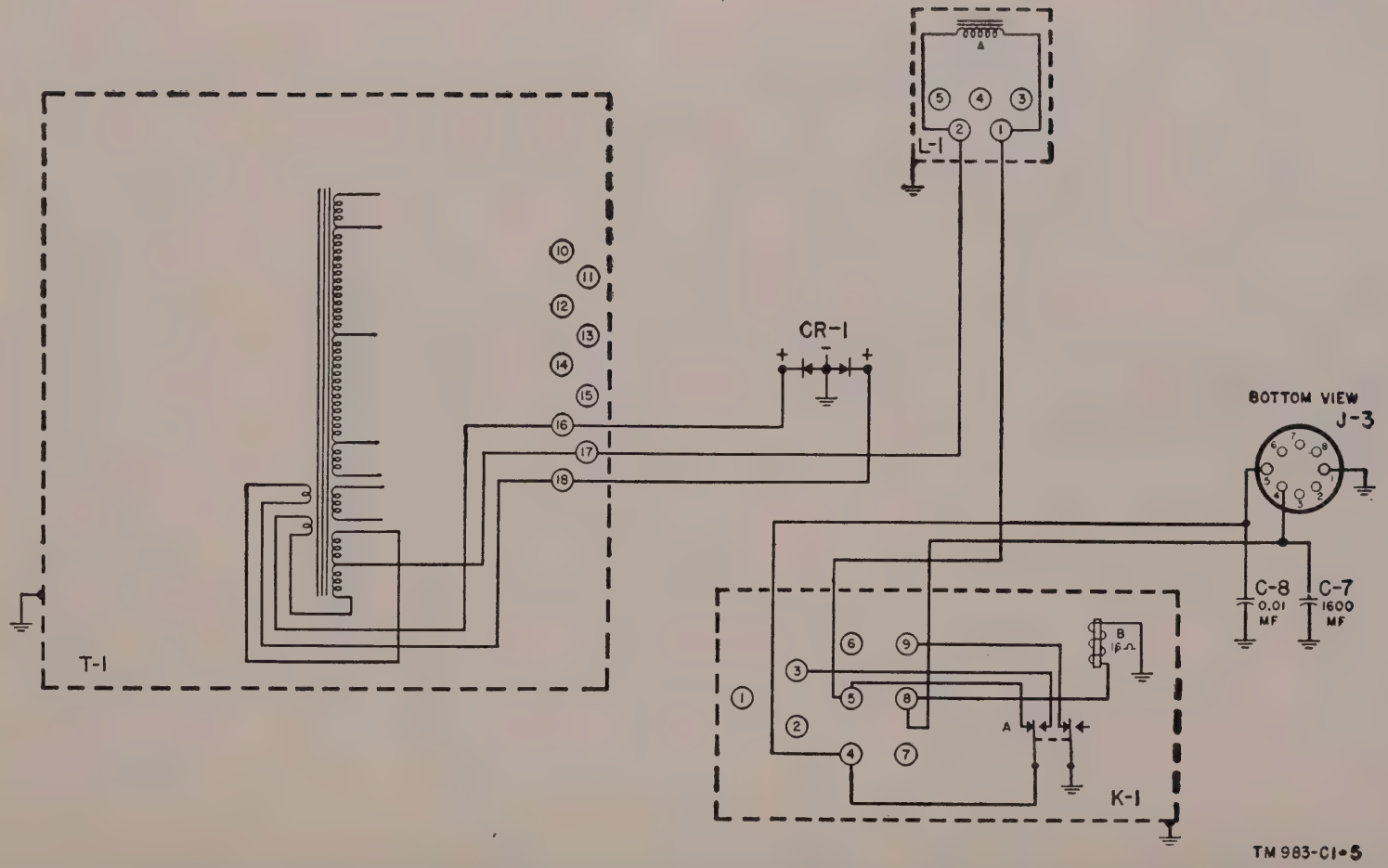

Figure 14. (added). *Vibrator Power Supply PP–114A/VRC–3, radio filament supply circuit.*

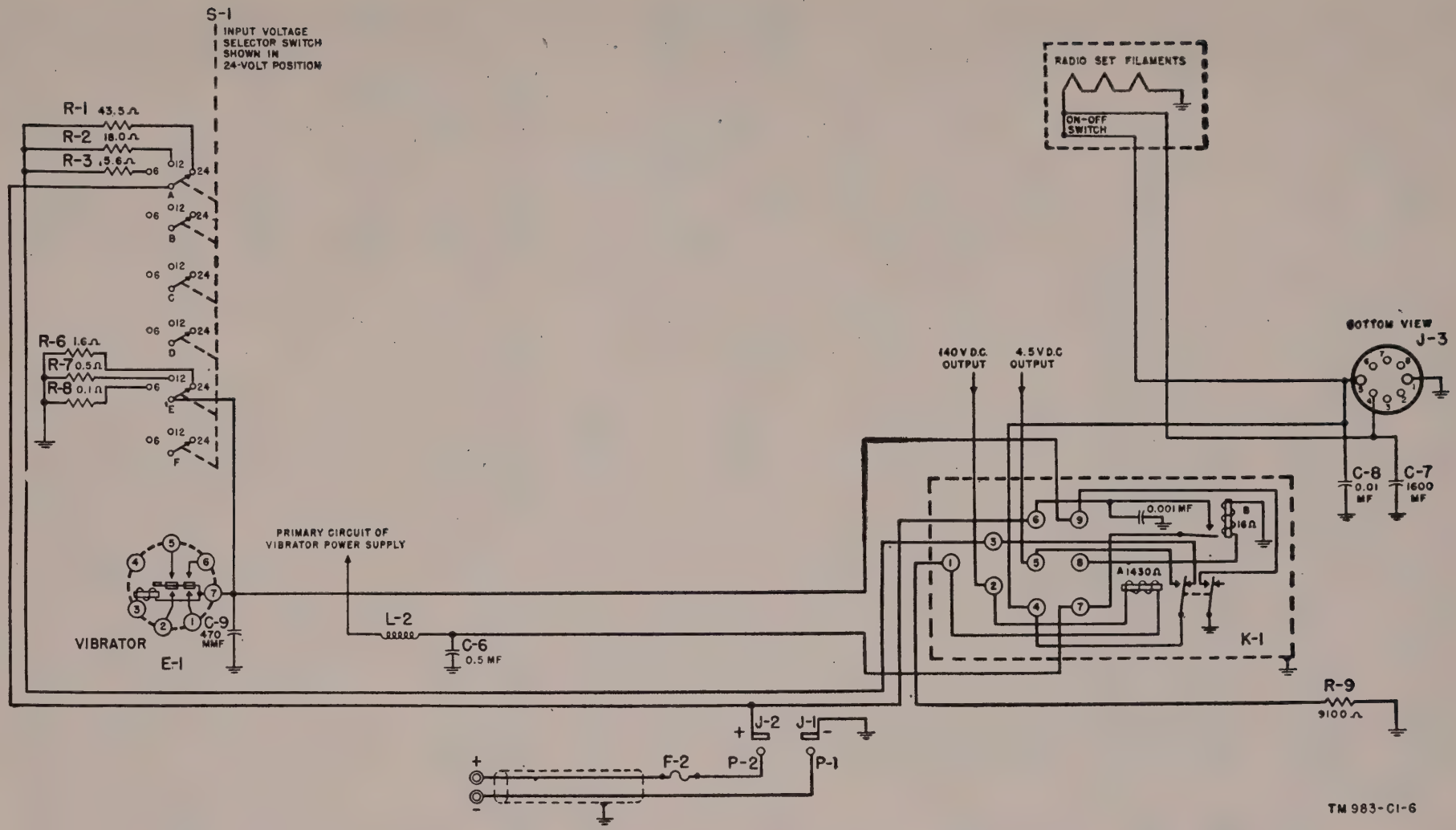

Figure 15.1 (added). Vibrator power supply PP–114A/VRC–3, automatic starting circuit, functional diagram.

32. General Trouble-Shooting Information

Caution: If the radio * * * the power supply.

* * * * * * *

b. Failure of the vibrator **may** result in a blown fuse. If the fuse * * * hours of operation.

* * * * * * *

34. Trouble-Shooting Procedures

a. RESISTANCE TESTS. A defective component * * * on all readings. Refer to the schematic diagrams (figs. 22 **and 22.1**).

(1) **Vibrator Power Supply PP–114/VRC–3.**

Test points	Meter reading (in ohms)	Circuit	Corrective measure
* *	*	*	* * *

(2) (added). *Vibrator Power Supply PP–114A/VRC–3.*

Test points	Meter reading (ohms)	Circuit	Corrective measure
Transformer T–1, terminal 11 to 12.	5. 5	Transformer secondary and capacitor C–4.	If shorted, disconnect wire from terminal 11 and recheck. If still shorted, replace transformer. If short is removed, replace capacitor C–4.
Transformer T–1, terminal 10 to 13.	24. 8	Transformer secondary.	If open or shorted, replace transformer.
Transformer T–1, terminal 2 to 8.	. 74	Transformer primary and capacitors C–1 and C–2.	If shorted, disconnect capacitors C–1 and C–2 from terminal 2 and recheck. If still shorted, replace transformer. If short is removed, check capacitors C–1 and C–2. Replace faulty capacitor.
Choke L–1, terminal 1 to 2.	. 5	Filament choke__	If defective, replace complete assembly.
Choke L–1, terminal 3 to 4.	55	Plate choke_____	If defective, replace complete assembly.
Choke L–1, terminal 4 to 5.	55	Plate choke_____	If defective, replace complete assembly.
Relay K–1, terminal 1 to ground.	9, 100	Bleeder resistor R–9.	If defective, replace resistor R–9.
Relay K–1, terminal 1 to 2.	1, 430	Cut-out relay coil_	If defective, replace complete assembly.
Relay K–1, terminal 8 to ground.	16	Starting relay coil_	If defective, replace complete assembly.

b. Typical Operating Voltages. At receive load * * * should be obtained:

(1) Vibrator Power Supply PP–114/VRC–3.

Test points				Meter readings		
*	*	*	*	*	*	*

(2) (Added.) *Vibrator Power Supply PP–114A/VRC–3.*

Test points	Meter readings
Transformer T–1, terminal 10 to ground	180 volts ac.
Transformer T–1, terminal 13 to ground	180 volts ac.
Transformer T–1, terminal 10 to 13	300 volts ac.
Transformer T–1, terminal 11 to 12	300 volts ac.
Transformer T–1, terminal 16 to 18	12.1 volts ac.
Transformer T–1, terminal 14 to 15	12.1 volts ac.
Transformer T–1, terminal 2 to 8	45 volts ac.
Choke L–1, terminal 4 to ground	150 volts dc.
Tube V–1, terminal 8 to ground	152.5 volts dc.
Choke L–1, terminal 3 to ground	147.5 volts dc.
Choke L–1, terminal 2 to ground	4.7 volts dc.
Choke L–1, terminal 1 to ground	4.6 volts dc.
Connector J–3, terminal 7 to ground	147.5 volts dc.
Connector J–3, terminal 6 to ground	92 volts dc.
Connector J–3, terminal 5 to ground	4.6 volts dc.
Connector J–3, terminal 4 to ground	4.5 volts dc.

* * * * * * *

e. Improper Low B Voltage. Improper low B voltage at terminal 6 on connector J–3 may be due to a faulty capacitor C–5, tubes V–1 or V–2, the cut-out relay, or the bleeder resistor (**K–1R figure 13, R–9 figure 13.1**).

35. Replacement of Parts

* * * * * * *

d. Other Components. Other components will * * * components and connections.

Note (added). Relay assembly K–1 used in Vibrator Power Supply PP–114A/VRC–3 is not interchangeable with relay assemblies used in previous models

37. Unsatisfactory Equipment Report (Superseded)

a. WD AGO Form 468 (Unsatisfactory Equipment Report) for Equipment Used by the Army. WD AGO Form 468 will be filled out and forwarded through channels to the Office of the Chief

Signal Officer, Washington 25, D. C., when trouble occurs more often than is normal, as determined by qualified repair personnel.

b. AF Form 54 (Unsatisfactory Report) for Equipment Used by the Department of the Air Force. AF Form 54 will be filled out and forwarded to Commanding General, Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, in accordance with AF Regulation 15–54.

Section XIII.I (added). IDENTIFICATION TABLE OF PARTS FOR VIBRATOR POWER SUPPLY PP–114A/VRC–3

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the part. Requisitions must cite an authorized basis, such as T/O & E's, T/E's, T/A's, T/BA's, SIG 6, SIG 7 & 8, SIG 7–8–10, SIG 10, list of allowances of expendable material, or another authorized supply basis.

38.1 Department of the Army Supply Catalog Reference

For an index of available catalog pamphlets, see the latest issue of Department of the Army Supply Catalog SIG 1.

38.2 Vibrator Power Supply PP–114A/VRC–3

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	VIBRATOR POWER SUPPLY PP–114/VRC–3, PP–114A/VRC–3: vibrator type; output nominally 140 v DC, 4.5 v DC at 50 ma and 500 ma, respectively; input voltage 6, 12, 24 v DC at 7, 4, 2 amp, respectively; w/rectifier Tube JAN–1005; 12″ lg x 7½″ d x 9⅝″ h.	Provides power for operation of Radio Receiver and Transmitter BC–1000–( ).	3H6702–114
	CABLE ASSEMBLY, power: two #12 AWG cond, ea comprising 64 #30 AWG strands; ins, rubber-jacketed; round, 0.497″ diam; 124″ lg including terminations; two Zierick #118 clincher lugs one end, 2 Belden Diet soldering lugs other end; Electronic Labs #A–1848; Espey #B13.040 (batt cable).	Provides connection between PP–114A/VRC–3 and 6-, 12-, or 24-volt power source.	3E7264
C–9	CAPACITOR, fixed: mica; 470 mmf ±10%; 500 vdcw; JAN type CM20B471K.	Ground-return r-f bypass.	
C–8	CAPACITOR, fixed: mica; 10,000 mmf ±10%; 300 vdcw; 53/64″ sq x 11/32″ thk; JAN type CM35B103K.	Bypasses r-f currents to ground. R-f filter for filament circuit.	3K3510321
C–3	CAPACITOR, fixed: paper; 500,000 mmf ±10%; 50 vdcw; HS metal case; mineral oil impregnated; body dimen 1⅞″ lg x 13/16″ diam; w/mtg flange at term end of case; Fast per Espey #N25.189.	R–f filter for input circuit	3DA500–608
C–6	CAPACITOR, fixed: paper; 500,000 mmf ±10%; 50 vdcw; HS metal case; mineral oil impregnated; body dimen 1⅞″ lg x 13/16″ diam; w/mtg flange at end opposite term; Fast per Espey #N25.227.	R–f filter for input circuit	3DA500–607
C–4	CAPACITOR, fixed: paper; 1 mf ±10%; 1000 vdcw; HS metal case; body dimen 1 13/16″ lg x 1 1/16″ thk x 2¼″ h; castor oil impregnated; JAN type CP70B1DG105K.	Tank capacitor functioning as part of regulating circuit to provide constant voltage over wide range of input voltage.	3DB1–203

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C–1, C–2	CAPACITOR, fixed: paper; 2 mf ±10%; 600 vdcw; HS metal case; castor oil impregnated; body dimen 1 13/16″ lg x 1 1/16″ thk x 1 5/8″ h; uses bkt JAN type CPO7FA3, normally not supplied; JAN type CP70E1DF205K.	Buffer capacitors. Provides neutralization of the effect of the inductive reactance of transformer T–1.	3DB2–172
C–5	CAPACITOR, fixed: paper; 3 sect; 4–4–4 mf ±20% −0%; 600 vdcw; HS metal case; mineral oil impregnated; body dimen 4″ lg x 3 5/16″ wd x 2″ thk; Capacitron #A1049, Espey #N25.191.	Part of ripple filter circuit	3DB4–192
C–7	CAPACITOR, fixed: electrolytic; 1600 mf ±250% −10%; 15 vdcw; JAN–C–62, JAN CE31F162E; Espey #25.192.	Filament circuit audio ripple filter.	3DB1000–13
L–2	COIL, RF: choke; single-winding, single-layer wound; unshielded; 30 turns #16 AWG; 2″ lg x 5/8″ OD; Espey #N–2.406.	R-f filter for input circuit	3C323–35J
J–3	CONNECTOR, female contact; 2 large and 6 small cont, polarized; bakelite body; 2 3/16″ lg x 1 5/8″ wd x 5/32″ thk; Cinch #4039.	Provides receptacle for connector to equipment power.	2Z8678.221
J–1, J–2	CONNECTOR, female contact: single banana type; rated 10 amp; brass, nickel pl; 7/8″ lg x 1/2″ diam; Bud Rad #PJ–963.	Serves as voltage input connector.	2ZK5584
	FASTENER, latch: trunk; steel, olive drab; 2″ lg x 1 3/8″ wd x 9/16″ thk o/a; w/2 coil springs; stainless steel links; Corbin Cabinet #15824 per SC–D–20648.	Secures radio receiver and/or equipment cover to power supply unit.	6Z3810–68
F–2	FUSE, cartridge: 5 amp, 250 v; glass body; ferrule 1/4″ diam x 1/4″ lg; 1/4″ diam x 1 1/4″ lg o/a; Littelfuse #1358.	Prevents overload damage	3Z2605.2
F–1	FUSE FU–21, cartridge: 10 amp, 25 v; glass body; ferrule 1/4″ diam x 1/4″ lg; 1/4″ diam x 1 1/4″ lg o/a.	Prevents overload damage	3Z1921
	GASKET: black neoprene; for cover; molded to form rectangle 5 7/32″ x 11 1/32″, 1/4″ cross section; Electronic Labs #N–865, Espey #B27.1234.	Provides seal between cover and power supply unit.	3H2154.12–3
	GROMMET: neoprene, shore type A, Durometer hardness of 50–55; fits 7/16″ diam hole; 1/4″ hole diam x 1/16″ wd groove, 3/16″ wd x 5/8″ diam o/a; Atlan India Rub #97, AN–931–4–7.	----------	2Z8495.5

	GROMMET: neoprene, shore type A, Durometer hardness of 50–55; fits 5/16″ diam hole; 3/16″ hole diam x 1/16″ wd groove, 3/16″ wd x 7/16″ diam o/a; Atlan India Rub #2286, AN–931–3–5.	----------	6Z4895
	GROMMET: cord grip; Buna S; for cord 3/8″ to 1/2″ diam; 15/16″ max diam x 5/8″ lg; Pyle-National #DB–9D.	----------	6Z4853–2
	HOLDER, fuse: extractor post; for single #3AC type fuse; bakelite body; 15 amp, 250 v; 2 3/8″ lg x 1 1/16″ diam; Buss #HKM–W.	Holds fuse----------	3Z2878–1.4
	NUT, thumb: wing; steel, zinc pl; #8–32 thd; 7/16″ h; 13/16″ wd across wings; Electronic Labs #U–753.	Secures tube clamp to chassis-	6L3708–32.3
L–1	REACTOR ASSEMBLY: c/o 3 iron core a-f filters; A choke 0.5 ohms, 0.03 hy, 0.85 amp DC; B choke 55 ohms, 3.1 hy, 0.09 amp DC; pitched, HS case; 3 7/16″ x 2″ wd x 3 7/8″ lg o/a; ADC #AY–1644, Espey #A16.237 per JAN T–27.	Part of ripple filter circuit----	3C323–35K
CR–1	RECTIFIER, metallic: selenium; input 7.4 v AC, 60 cyc; output 5.3 v DC, 2.4 amp; 3/4″ x 3 1/2″ h x 1 9/32″ thk; Benwood Lnz #27751; Espey #N31.018.	Low-voltage rectifier---------	3H4859–62
K–1	RELAY ASSEMBLY: armature; c/o B, SPST normally open, 4.5 v DC, 16 ohm coil, cont rated 10 amp; A, DPDT, 50 v DC, 1450 ohm coil, cont rated 10 amp DC; one capacitor JAN–CM30C102M; relays fast acting; HS metal case; Espey #N–12.106 (for Order No. 9829–Phila–48 only).	Part of automatic starting circuit; acts as vibrator protective device.	2Z7598–62–1
R–6	RESISTOR, fixed: WW; 1.6 ohms ±5%; 7 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30G1R6.	Equalizes potentials across primaries of transformer T–1; current-limiting resistor.	3R12001
R–7	RESISTOR, fixed: WW; 0.5 ohm ±10%; 7 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30GR50.	Same as R–6.	
R–3	RESISTOR, fixed: WW; 5.6 ohms ±5%; 8 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30G5R6.	Input voltage-dropping resistor.	3RW10802
R–2	RESISTOR, fixed: WW; 18 ohms ±5%; 7 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30G180.	Input votlage-dropping resistor.	3RW13802

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
R–1	RESISTOR, fixed: WW; 43.5 ohms ±2%; 12 w; 2″ lg x 19/32″ diam; WL per Espey #N14.057 (not used or first part of Order No. 5991–Phila–45–10).	Input voltage-dropping resistor.	3Z6004A3–4
R–5	RESISTOR, fixed: WW; 50 ohms ±5%; 7 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30G-500.	Voltage-dropping resistor; provides 6 v to vibrator driving coil on 24-v supply.	3RW16527
R–4	RESISTOR, fixed: WW; 150 ohms ±5%; 12 w; 2″ lg; WL per Espey #N14.060.	Voltage-dropping resistor; provides 6-v to vibrator driving coil on 12-v supply.	3ZK4950–1
R–8	RESISTOR, fixed: WW; 0.1 ohm ±10%; 7 w; body dimen 1″ lg x 19/32″ diam; JAN type RW30GR10.	Same as R–6	3RC40BF103K
R–9	RESISTOR, fixed: comp; 9100 ohms ±5%; 2 w; max body dimen 1.78″ lg x 0.405″ diam; JAN type RC41AE912J.	Part of voltage divider. Provides low B voltage.	
	SOCKET, tube: med 7 cont; mica filled bakelite; body dimen 1 5/16″ diam x 7/16″ h; Amphenol #M1P–7S–M; Espey #N32.280.	Receptacle for vibrator	2Z8677.91
	SOCKET, tube: octal; ceramic; body dimen 1 3/32″ diam x 9/16″ thk; saddle mtg; Ucinite #115001–2, Espey #N32.279.	Receptacles for rectifier tubes	2Z8650.4
S–1	SWITCH, rotary: 6 pole, 3 position, single sect; bakelite body, aluminum shell; 1 11/16″ diam x 1 19/32″ h o/a; Mallory #S163–J per Electronic Labs #E–137.	Power input selector switch	3Z9825–55.73
T–1	TRANSFORMER, power: pl and fil; pri 6/12/24 v, 180 cyc; secd #1, 300 v AC at 0.042 amp CT, secd #2, 12.1 v AC at 100 ma, secd #3, 12.1 v AC at 0.45 amp CT; incl pri and secd bucking coils; HS metal case; 6 7/8″ lg x 3 3/4″ wd x 3 7/16″ h; Sherold T–133; Espey #D.18.073.	Power supply transformer	2Z9614–129
	Note. This transformer cannot be used as a replacement in previous models.		

V–1, V–2	TUBE, electron: JAN–1005	Rectify high voltage	2J1005
	VIBRATOR, nonsynchronous: input 6 v DC, 6.5 amp; single reed, freq 180 ± 2 cyc; tubular aluminum case; 3¼″ lg x 1½″ diam; Electronic Labs #AA–1642.	Converts dc to pulsating dc	3H6691–17
	WASHER, flat: bakelite, clear varnish; fungus resisting; round 13/64″ ID x 9/16″ OD x 1/32″ thk; Electronic Labs #U–1056.		3G1838–9.17
	WASHER, flat: bakelite, clear varnish; round 9/64″ ID x ½″ OD x 1/32″ thk; Electronic Labs #U–1144.	Insulates resistors and r-f choke.	3G1838–8.16
	WASHER, flat: bakelite, clear varnish; fungus resisting; round 0.203″ ID x ⅝″ OD x 0.062″ thk; Electronic Labs #U–1058.	Insulates + input plug outside panel.	3G1838–10.20
	WASHER, flat: bakelite, clear varnish; fungus resisting; round 0.390″ ID x ⅝″ OD x 0.031″ thk; Electronic Labs #U–1059.	Insulates + input jack	3G1838–10.21
	WASHER, flat: bakelite, clear varnish; fungus resisting; round 0.390″ ID x ⅝″ OD x 0.062″ thk; Electronic Labs #U–1060.	Insulates + jack inside panel	3G1838–10.22

Section XIV. REFERENCES

Note (added). For availability of items listed, check FM 21–6 and Department of the Army Supply Catalog SIG 1; also see latest issue of FM 21–6 for applicable technical bulletins, supply bulletins, modification work orders, and changes thereto.

39. Supply Publications

SIG 1—Introduction and Index.

* * * * * * *

SB 11–76—Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

41. (Superseded) Packaging and Packing Instructions

a. Joint Army-Navy Packaging Specifications.
JAN–D–169—Desiccants, Activated.
JAN–P–100—General Specifications.
JAN–P–106—Boxes, Wood, Nailed.
JAN–P–116—Preservation, Methods of.
JAN–P–125—Barrier Material, Waterproof.
JAN–P–131—Barrier Material, Moisture-Vaporproof, Flexible.

b. U. S. Army Specification.
100–2E—Marking Shipments by Contractors (and Signal Corps Supplement thereto).

c. Signal Corps Instructions.
720–7—Standard Pack.
726–15—Interior Marking.

45. Other Publications

FM 21–6—List of Publications for Training.

* * * * * * *

TB SIG 72—Tropical Maintenance of Ground Signal Equipment.

* * * * * * *

Figure 17. Vibrator Power Supply PP–114/VRC–3, chassis, bottom view.

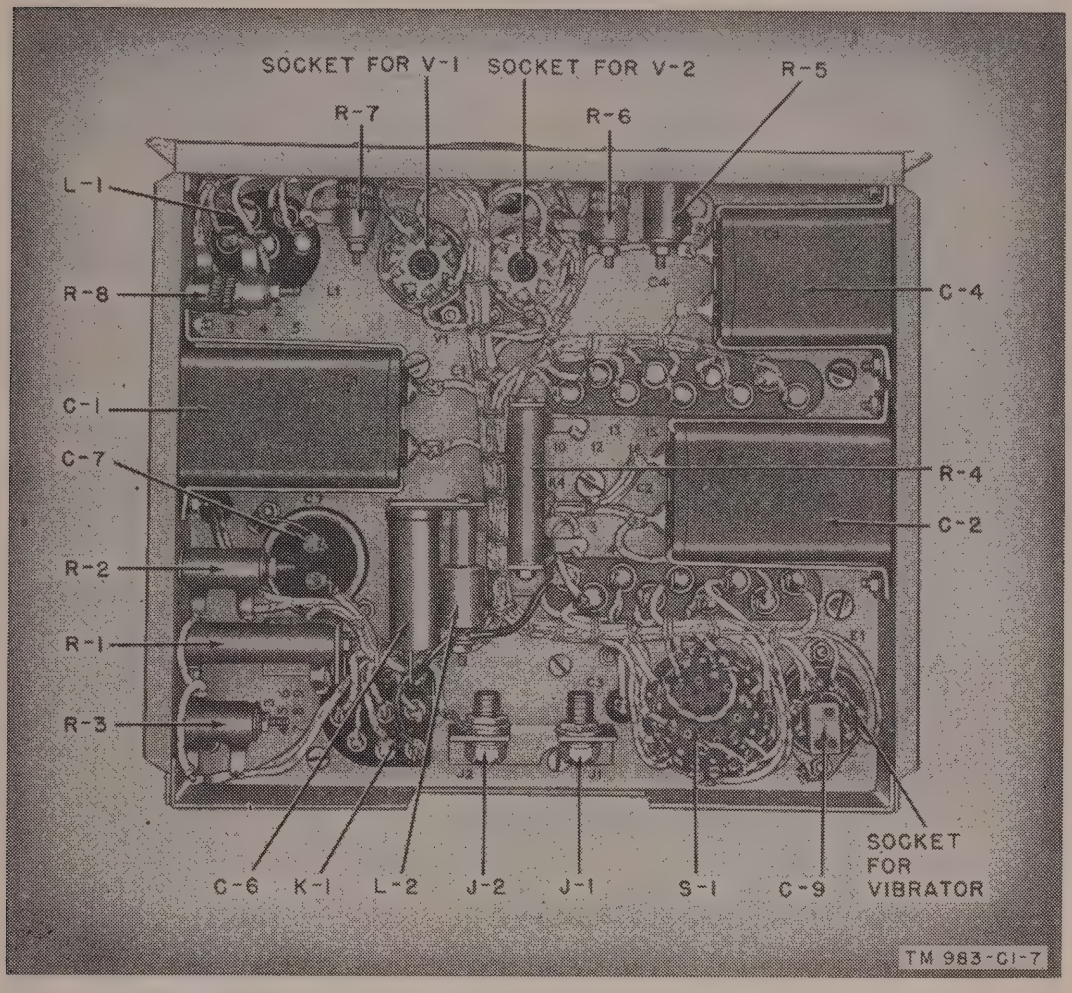

Figure 17.1 (added). Vibrator power supply PP–114A/VRC–3, chassis, bottom view.

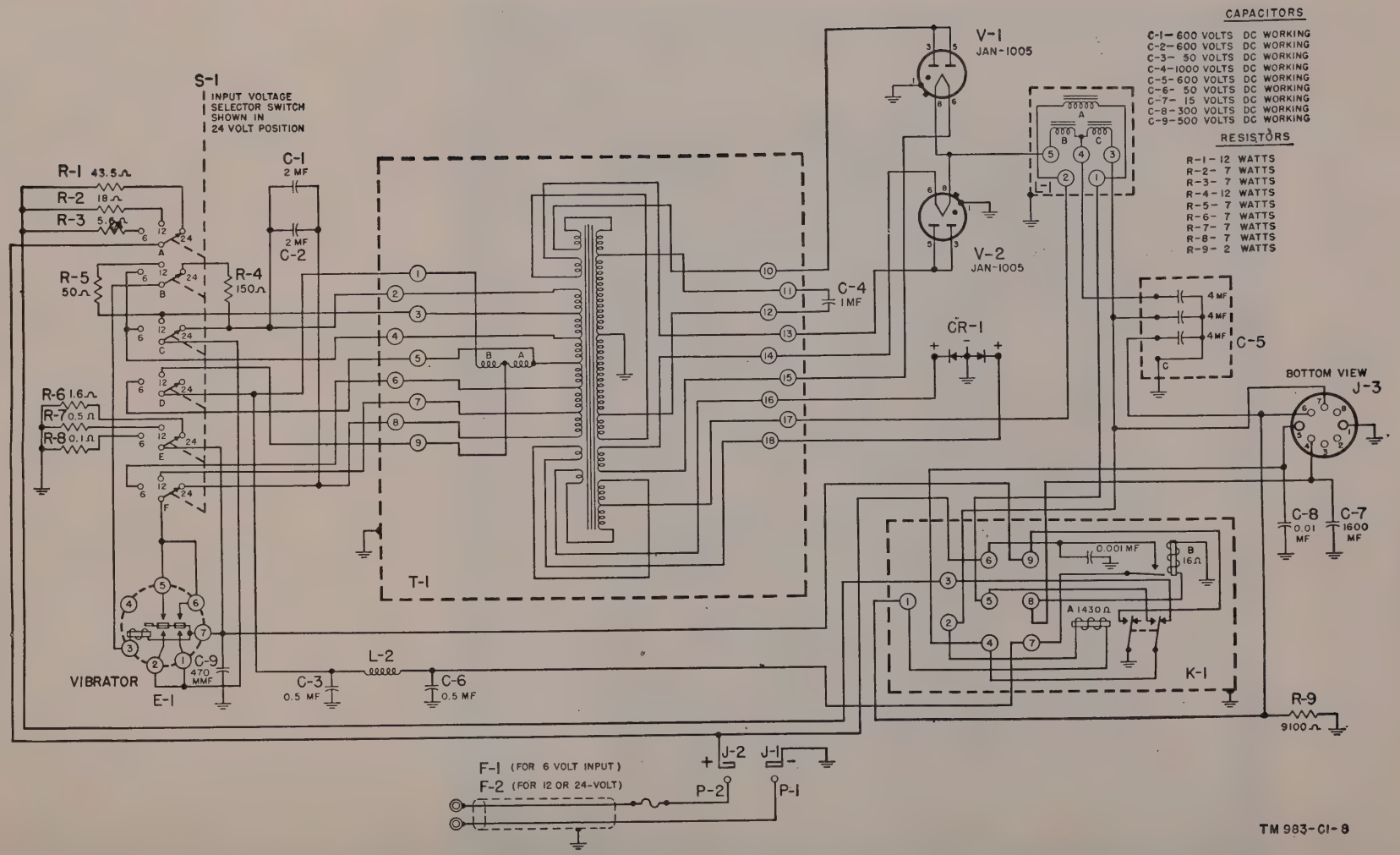

Figure 22.1 (added). Vibrator power supply PP-114A/VRC-3, schematic diagram.

[AG 300.7 (12 Jul 49)]

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Major General
The Adjutant General

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For explanation of distribution formula, see SR 310–90–1.

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TM 11-983

VIBRATOR POWER SUPPLY

PP-114/VRC-3

WAR DEPARTMENT *27 FEBRUARY 1945*

WAR DEPARTMENT,
WASHINGTON 25, D. C., 27 February 1945.

TM 11-983, Vibrator Power Supply PP-114/VRC-3, is published for the information and guidance of all concerned.

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(For explanation of symbols see FM 21-6.)

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DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut —Use axes, handaxes, machetes.
3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives—Use firearms, grenades, TNT.
5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—Vibrator, transformers, tubes, capacitors, relay, resistors, etc.
2. Cut —All wiring and cabling.
3. Burn —All parts.
4. Bend —Case, chassis, transformers, cores, etc.
5. Bury or scatter—All parts.

DESTROY EVERYTHING

Vibrator Power Supply PP-114/VRC-3, shown mounted under Radio Receiver and Transmitter BC-1000-( ).

PART ONE
INTRODUCTION

SECTION I
DESCRIPTION OF VIBRATOR POWER SUPPLY PP-114/VRC-3

1. GENERAL.

a. Vibrator Power Supply PP-114/VRC-3 consists of a chassis and panel mounted in a metal case. A connector, mounted on the panel, provides for output connections (fig. 6). Input connections are made by means of a cable permanently attached to two banana plugs mounted on the inside of the chassis. These plugs engage two jacks (which are mounted on the chassis) when the chassis and outer case are assembled.

b. The fuse is mounted in a holder directly above the input cable entrance; spare fuses are in a compartment mounted on the back of the outer case (fig. 2). All other electrical components are mounted on the chassis as shown in figures 5, 17, 18, and 19.

c. Flanges on the chassis slide into slotted brackets mounted on the outer case. These locate the chassis in the correct position and also hold it in place. Four screws in the corners of the panel provide an additional means of fastening the chassis (fig. 4). Two D rings are located on the chassis panel to facilitate removal of the chassis from the outer case. Snap fasteners are provided for fastening the power supply to the radio set.

d. The power supply is shipped with a metal cover as shown in figure 2. The cover is used to protect the power supply during shipment.

e. Official nomenclature followed by ( ) indicates reference to all models. Throughout this manual, therefore, Radio Receiver and Transmitter BC-1000-( ) refers to all models of that equipment.

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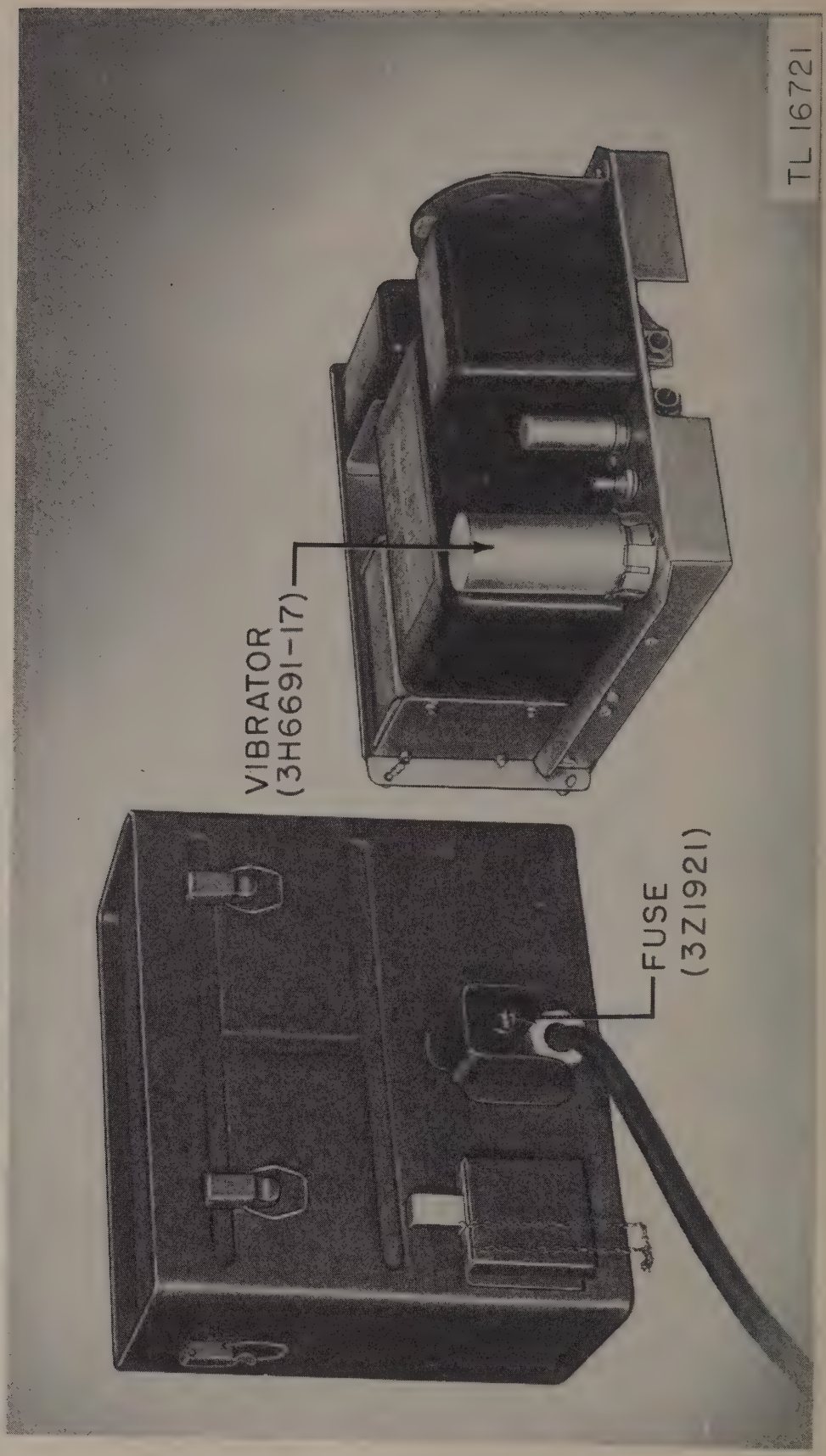

Figure 1. Vibrator Power Supply PP-114/VRC-3, showing Signal Corps stock numbers of first and second echelon maintenance parts.

2. APPLICATION.

Vibrator Power Supply PP-114/VRC-3 is part of Radio Set AN/VRC-3, and is designed to produce power for operation of Radio Receiver and Transmitter BC-1000-( ) from the electrical system of a 6-, 12-, or 24-volt vehicle.

3. TECHNICAL CHARACTERISTICS.

a. Input Voltage. Vibrator Power Supply PP-114/VRC-3 is capable of operation at any input voltage within three input ranges. The change from one input position to another is accomplished by means of a rotary switch (fig. 5). The three input positions and the corresponding values for each position are as follows:

Input voltage (volts dc)			
	6-volt position	*12-volt position*	*24-volt position*
Maximum	7.5	15	30
Rated	6.3	12.6	25.2
Minimum	5.7	11.4	22.8

b. Output Voltage. When operated within input ranges shown above, the output voltages will fall within the limits shown in the following table:

Output voltage (volts dc)					
	Full load			*No load*	
	High B	*Low B*	*Filament*	*High B*	*Filament*
Maximum	150	90	4.9	150	5.2
Rated	140	80	4.5	.....	.....
Minimum	125	70	3.6	.....	.....

c. Current Drain. When operated within input voltage ranges shown above, the current drain on the battery will be as follows:

Current drain (amp)		
6-volt position	*12-volt position*	*24-volt position*
7	4	2

4. TABLE OF COMPONENTS.

Component	*Required number*	*Height (in.)*	*Depth (in.)*	*Length (in.)*	*Weight (lb)*
Vibrator Power Supply PP-114/VRC-3, complete with tubes, fuses, and cables.	1	9⅝	7¼	12	28

5. PACKAGING DATA.

Vibrator Power Supply PP-114/VRC-3 is packed for export shipment in a wooden case, 18¼ inches long, 14½ inches deep, and 15⅞ inches high. The power unit and case weigh 62 pounds. For dimensions of unpacked unit, see figure 3 and paragraph 4.

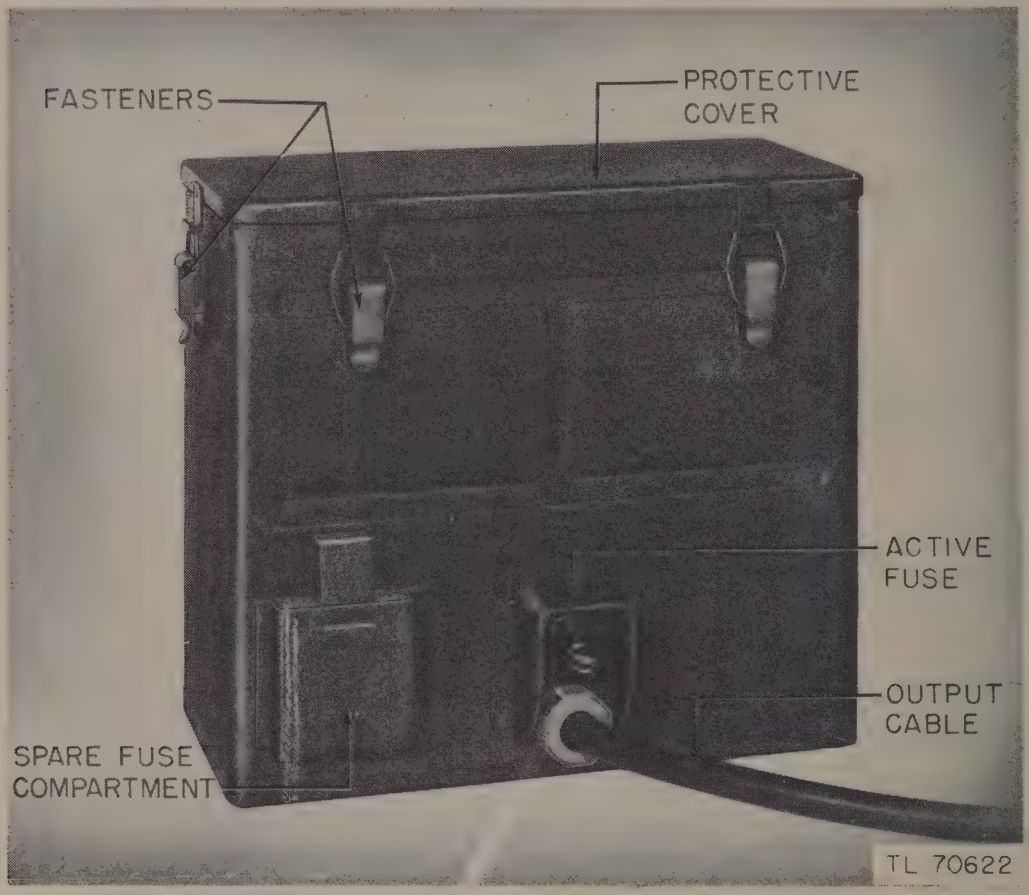

Figure 2. Vibrator Power Supply PP-114/VRC-3, back view.

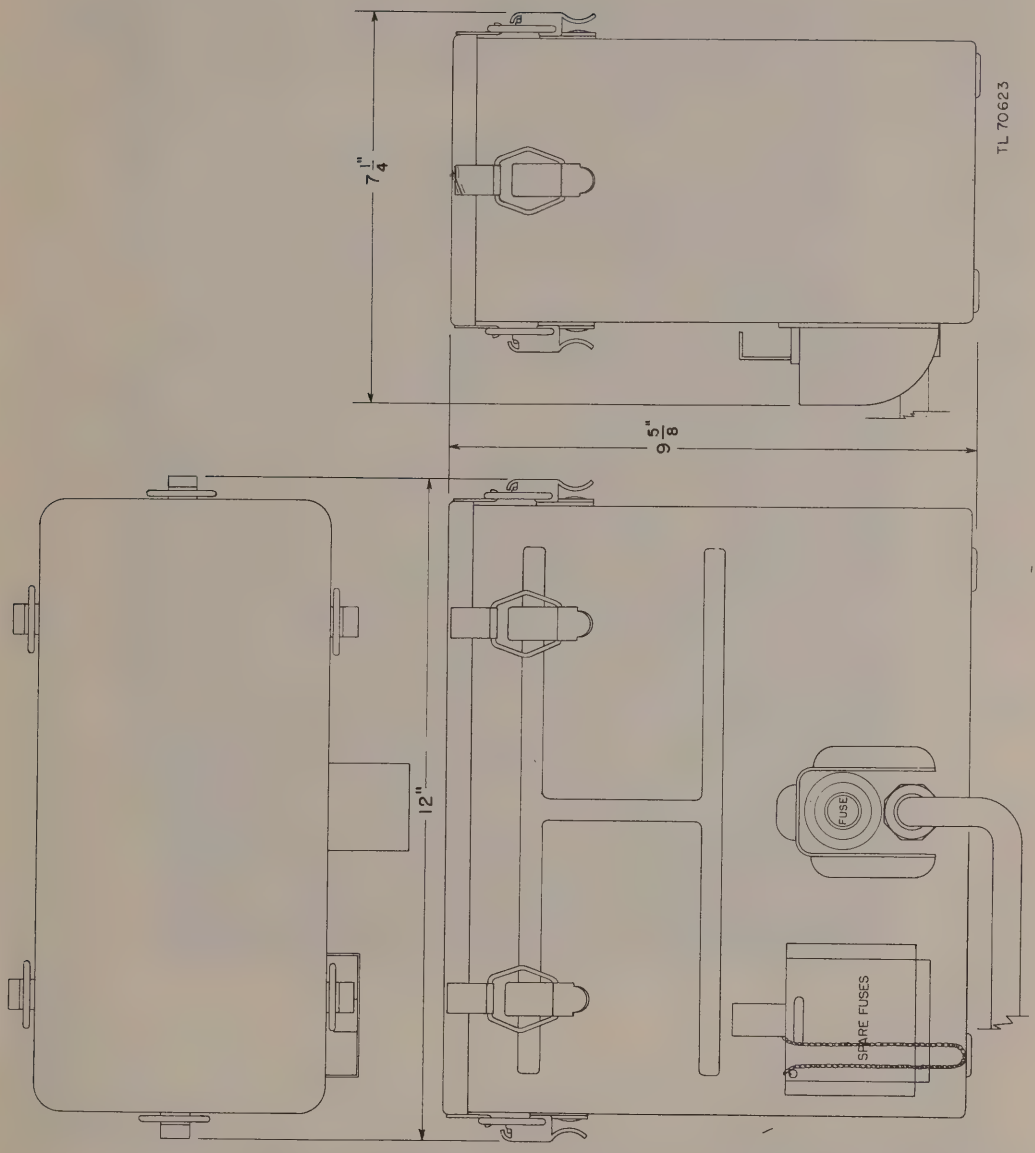

Figure 3. Vibrator Power Supply PP-114/VRC-3, outline dimensional drawing.

Figure 4. Vibrator Power Supply PP-114/VRC-3, chassis and outer case.

SECTION II

INSTALLATION OF VIBRATOR POWER SUPPLY PP-114/VRC-3

6. UNPACKING AND CHECKING.

a. Unpacking. Vibrator Power Supply PP-114/VRC-3 is packed for export shipment in a wooden case. The unit is completely assembled and no loose parts or cables are contained in the shipping case. Unpack as outlined below.

(*1*) Remove steel straps from around the wooden shipping box, then remove the cover of the box which is nailed in place.

(*2*) Carefully remove the waterproof liner and corrugated carton which hold the unit and protective plywood blocks.

(*3*) Remove the steel straps and plywood blocks. Remove the butvar bag.

(*4*) The unit itself is sealed in a corrugated carton with pads and silica gel. Remove the carton and packing material from around the unit.

b. Checking.

(*1*) The operation of Vibrator Power Supply PP-114/VRC-3 cannot be checked electrically until after the power supply has been connected to Radio Receiver and Transmitter BC-1000-( ) (par. 33).

(*2*) Check visually for mechanical damage caused in shipping.

(*3*) Remove chassis from the outer case (fig. 4) and check the following:

(*a*) Check vibrator. Make sure it is firmly seated in its socket.

(*b*) Check tubes. Be sure that the tube clamps are in position and that the wingnut which holds them in place is securely fastened.

7. CONNECTIONS AND INTERCONNECTIONS.

a. Setting Input Selector Switch. Input selector switch S1 must be set to correspond with the input voltage being used. It is located on the chassis, and its positions are clearly marked (fig. 5). There is no external connection to the input selector switch. The chassis must be removed from the outer case to set the switch to the correct position.

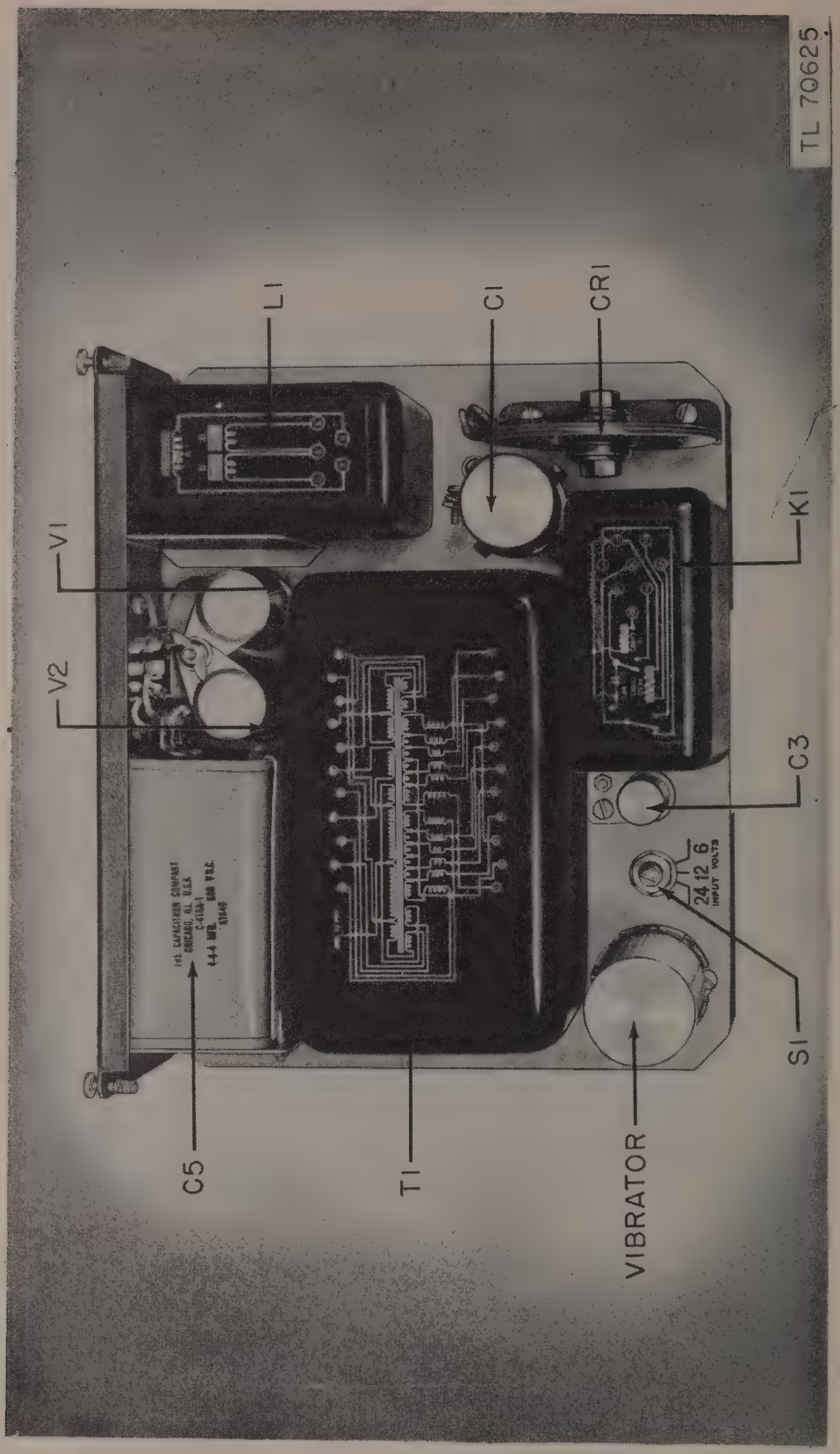

Figure 5. Vibrator Power Supply PP-114/VRC-3, top view of chassis, showing location of input selector switch.

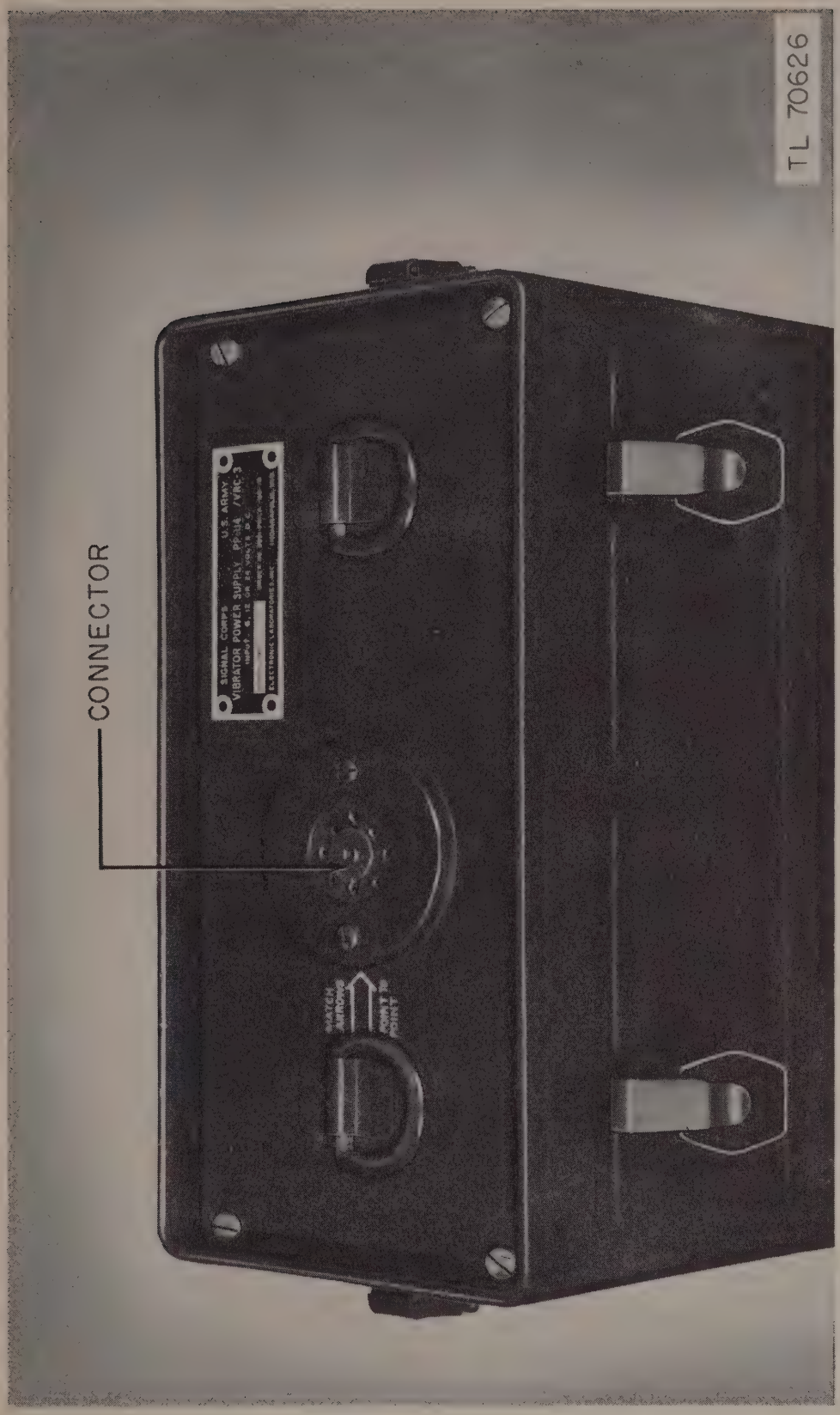

Figure 6. Vibrator power supply panel, showing connector.

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Figure 7. Connection of Vibrator Power Supply PP-114/VRC-3 to Radio Receiver and Transmitter BC-1000-( ).

b. Connecting Power Supply to Radio Set.

(*1*) Remove the metal protective cover from the power supply.

(*2*) Place the vibrator power supply so that the connector panel is on top. Connect the rubber-covered plug from the radio set to the female connector on the power supply. Indexing is clearly marked on the power supply panel (fig. 6).

(*3*) Place the radio set on top of the power supply and fasten the hasp fasteners to hold it in place.

c. Connecting Input Cable. Connect the input cable to the terminals of the battery being used as a source of power. Observe polarity when connecting the input-cable battery terminals. Make sure that the black wire is connected to the negative battery terminal.

d. Fuses. The vibrator power supply is shipped with 10-ampere fuses for 6-volt operation only. To operate on a 12- or 24-volt input voltage, additional fuses must be obtained. The fuses for 12- and 24-volt operation are 5-ampere fuses. All fuses not in use should be carried in fuse compartment on the back of the case.

8. VEHICULAR INSTALLATION.

For detailed instructions on installation of Radio Set AN/VRC-3 in vehicles, refer to the TM 11-2700 series.

9. REPACKING INFORMATION.

a. Before repacking Vibrator Power Supply PP-114/VRC-3, check the following:

(*1*) Check vibrator and tubes. Be sure that the tubes are securely fastened in position and that the vibrator is securely seated in its socket.

(*2*) Check tightness of screws which hold the chassis in the outer case.

(*3*) Visually inspect other mechanical connections. Fasten any mechanical connections which may be loose enough to permit a component to break loose during shipment.

(*4*) Check for cleanliness. Clean if necessary.

b. When repacking Vibrator Power Supply PP-114/VRC-3, take precautions to protect the unit from moisture. Use an adequate amount of silica gel and seal the container. Follow the unpacking procedure (par. 6) in reverse.

PART TWO
OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III
CONTROLS AND THEIR USE

10. GENERAL.

a. No controls are provided on Vibrator Power Supply PP-114/VRC-3. Operation is controlled automatically by operation of the off-on switch on Radio Receiver and Transmitter BC-1000-( ).

b. Radio Receiver and Transmitter BC-1000-( ) is operated exactly the same when using the vibrator power supply as when using Battery BA-70.

SECTION IV
OPERATION

11. PRECISE OPERATING INSTRUCTIONS.

For precise operating instructions, refer to TM 11-637.

SECTION V
EQUIPMENT PERFORMANCE CHECK LIST

12. CHECKING PERFORMANCE OF EQUIPMENT.

Vibrator Power Supply PP-114/VRC-3 performs no function that can be observed independently from Radio Receiver and Transmitter BC-1000-( ) or a dummy load. When properly connected to Radio Receiver and Transmitter BC-1000-( ), the performance of the receiver and transmitter will indicate whether the power supply is functioning satisfactorily; provided, of course, that no fault exists in Radio Receiver and Transmitter BC-1000-( ). Refer to the equipment performance check list (table VI) in TM 11-637.

PART THREE
PREVENTIVE MAINTENANCE

SECTION VI
PREVENTIVE MAINTENANCE TECHNIQUES

13. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of radio communication depends upon each set's being *on the air* when it is needed and upon its *operating efficiency*. It is vitally important that radio operators and repairmen maintain their radio sets properly.

NOTE: The operations in sections VI and VII are first and second echelon (organization operators and repairmen) maintenance.

14. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts in Vibrator Power Supply PP-114/VRC-3 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains those specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations, namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate.

Throughout this manual the lettering system for the six operations will be as follows:

F —Feel
I —Inspect
T —Tighten
C —Clean
A —Adjust
L —Lubricate

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening and cleaning operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Feel. The feel operation is used most often to check rotating machinery, such as blower motors, drive motors, etc., and to determine if electrical connections, bushings, etc., are overheated. However, there is little chance that this equipment will become overheated, since any circuit condition which would cause overheating will immediately blow a fuse.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidences of minor trouble. Although these defects will not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning, in order to be able to recognize the signs of a defective set. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(*1*) Placement, by observing that all leads and cabling are in their original positions.

(*2*) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust,

corrosion, and other foreign matter. In tropical and high-humidity locations look for fungus growth and mildew.

(*3*) Tightness, by testing any connection or mounting which appears to be loose.

d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given whenever necessary throughout part three.

> **CAUTION:** Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond pressure for which they are designed will be broken or damaged.

Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. See section IX for details of moistureproofing and fungiproofing.

e. Lubricate. Lubrication refers to the application of grease or oil to the bearings of motors or other rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment. Vibrator Power Supply PP-114/VRC-3 requires no lubrication.

SECTION VII
ITEMIZED PREVENTIVE MAINTENANCE

15. INTRODUCTION.

For ease and efficiency of performance, preventive maintenance on Vibrator Power Supply PP-114/VRC-3 will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the power supply at the specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required for the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance.

16. COMMON MATERIALS NEEDED.

The following materials will be needed in performing preventive maintenance:

Common hand tools (TE-41 or equivalent).
Clean cloth.
Solvent, Dry-cleaning, Federal Specification P-S-661a.

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning, Federal Specification P-S-661a, is available, as a cleaning fluid, through established supply channels. Oil, Fuel, Diesel, U. S. Army Specification 2-102B, may be used for cleaning purposes when dry-cleaning solvent is not at hand. Carbon tetrachloride, or fire-extinguishing liquid (carbon tetrachloride base), will be used, if necessary, *only on contact parts of electronic equipment.*

17. ITEM 1, CHASSIS AND JOINTS.

a. Inspect (I). Inspect chassis and joints for cleanliness.

b. Clean (C). Clean exterior with clean cloth.

18. ITEM 2, INPUT PLUGS.

a. Inspect (I). Inspect input plugs in the bottom of the case for good contact and cleanliness.

b. Tighten (T). Spring tension on these plugs may be increased to provide better contact by spreading the split ends of the plug slightly with a knife or screwdriver.

c. Clean (C). Clean plugs with clean cloth.

19. ITEM 3, INPUT CABLE CONNECTIONS.

a. Inspect (I). Inspect input cable connections to vehicular battery terminals for tightness and cleanliness.

b. Tighten (T). Tighten all loose connections.

c. Clean (C). Wipe off cable connections with a clean dry cloth. Keep cable connections free of dirt and grease. If cable connections have any battery acid on them, wash with clear water and neutralize with soda. Dry thoroughly with a clean dry cloth.

20. ITEM 4, VIBRATOR.

Inspect (I) the vibrator to see that it is firmly seated in the socket.

21. ITEM 5, TUBES AND TUBE CLAMPS.

Inspect (I) the tubes for tightness in socket. See that the tube clamps are in position and that the wingnut which holds them in place is securely fastened.

22. PREVENTIVE MAINTENANCE CHECK LIST.

The following check list is a summary of the preventive maintenance operations to be performed on Vibrator Power Supply PP-114/VRC-3. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. The echelon column indicates which operations are first echelon maintenance and which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	*Operations*	*Item*	*When performed*							
			Before operation	*After operation*	*Daily*	*Weekly*	*Monthly*	*Semi-annually*	*Yearly*	*Echelon*
1	IC	Chassis and joints	*		*					1st
2	ITC	Input plugs	*		*					1st
3	ITC	Input cable connections	*		*					1st
4	I	Vibrator	*		*					1st
5	I	Tubes and tube clamps	*		*					1st

SECTION VIII
LUBRICATION

23. GENERAL.

No lubrication order has been issued for Vibrator Power Supply PP-114/VRC-3 since lubrication is not necessary.

SECTION IX
MOISTUREPROOFING AND FUNGIPROOFING

24. GENERAL.

When operated in tropical areas where temperature and relative humidity are extremely high, Signal Corps equipment requires special attention. These are some of the problems met:

a. Resistors, capacitors, transformer windings, etc., fail because of the effects of fungus growth and excessive moisture.

797991 O - 48 - 4

b. Electrolytic action, often visible in the form of corrosion, takes place in resistors, transformer windings, etc., causing eventual break-down.

c. Hook-up wire insulation and cable insulation break down. Fungus growth accelerates deterioration.

d. Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.

25. TREATMENT.

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. Refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment.

> **CAUTION:** Varnish spray may have poisonious effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth. Never spray varnish or lacquer near an open flame. Do not smoke in a room where varnish or lacquer is being sprayed. The spray may be highly explosive.

26. VIBRATOR POWER SUPPLY PP-114/VRC-3.

a. Preparation. Make all repairs and adjustments necessary for proper operation of the equipment.

b. Disassembly.

(*1*) Remove the four screws which hold the vibrator power unit to the case.

(*2*) Lift the chassis from the case. *Do not treat the case.*

c. Cleaning. Clean all dirt, dust, rust, fungus from the equipment to be processed. Clean all oil and grease from the surfaces to be varnished.

d. Masking. Cover the following parts with masking tape as shown in figures 8 and 9:

(*1*) Socket on front panel (item A, fig. 8).
(*2*) Voltage selector switch (item B, fig. 8).
(*3*) Openings at ends of jack (item C, fig. 8).
(*4*) Contacts of socket (item A, fig. 9).
(*5*) Selenium rectifier (item B, fig. 9).
(*6*) Tube-clamp wingnut and bolt (item C, fig. 9).

e. Drying. Place equipment in oven or under heat lamps and dry for 2 or 3 hours at 160° F. If wax should begin to melt on any of the parts, lower the temperature and increase baking time 1 hour for each 10° drop in temperature.

f. Varnishing.

(*1*) Spray with three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec No. 71-2202 (Stock No. 6G1005.3), or equal). Allow each coat to air-dry for at least 15 or 20 minutes before applying the next coat.

(*2*) Apply varnish immediately after the equipment is dried. If varnish is not applied immediately, moisture will condense on the equipment. Varnish applied over the moisture peels off readily after the varnish has dried.

(*3*) Inspect treated equipment and brush-coat any portions not reached by spraying. Make sure all parts are adequately protected by varnish.

g. Reassembly.

(*1*) Remove all masking tape, being careful not to peel varnish from the nearby areas.

(*2*) Reinsert power unit in outer case, and tighten the four screws securely.

(*3*) After reassembling the set, test its operation.

h. Marking. Mark the letters MFP and the date of treatment below the nameplate on the top of the power supply unit.

EXAMPLE: MFP—8 Jan 45.

27. MOISTUREPROOFING AND FUNGIPROOFING AFTER REPAIRS.

If, during repair, the coating of protective varnish has been punctured or broken, and if complete treatment is not needed to reseal the equipment, apply a brush-coat to the affected part. Be sure the break is completely sealed.

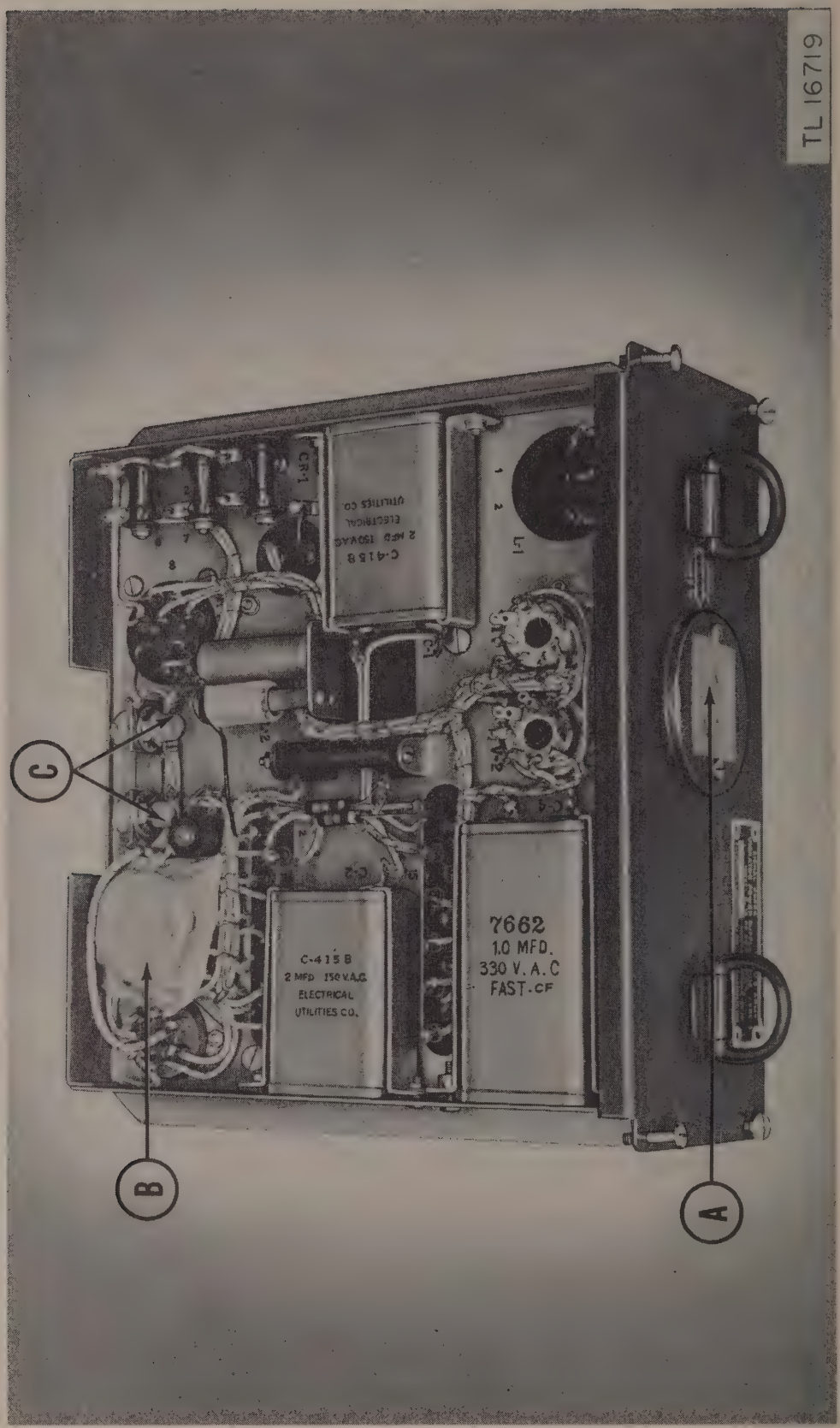


Figure 8. Vibrator Power Supply PP-114/VRC-3, bottom view of chassis, masked.

Figure 9. Vibrator Power Supply PP-114/VRC-3, top view of chassis, masked.

PART FOUR
AUXILIARY EQUIPMENT

(NOT USED)

PART FIVE
REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form No. 54 (unsatisfactory report). If either form is not available, prepare the data according to the sample form reproduced in figure 16.

SECTION X
THEORY OF EQUIPMENT

28. GENERAL CIRCUIT DESCRIPTION.

The principal working parts of Vibrator Power Supply PP-114/VRC-3 consist of an input cable with associated fuse and connectors, a vibrator, an input selector switch, a power transformer, a relay assembly, rectifier tubes, a selenium rectifier, a filter choke assembly, a tank capacitor, and various other capacitors and resistors essential to operation.

29. PRIMARY CIRCUIT.

a. Although Vibrator Power Supply PP-114/VRC-3 may be operated from three different input voltages (6, 12, or 24 volts direct current), functioning of the circuit is essentially the same on all voltages. Multiple windings on the power transformer T1 provide for operation from any one of the three input voltages. The position of input selector switch S1 determines which windings are in the circuit. Other components particularly required for each voltage are also connected into the circuit by the input selector switch. Voltage is applied through the input cable to the correct primary windings of the power transformer. The vibrator is connected in the primary circuit to provide reversal of the d-c (direct-current) input voltage at a frequency of 180 cycles per second, thus giving the effect of an alternating voltage on the transformer primary system.

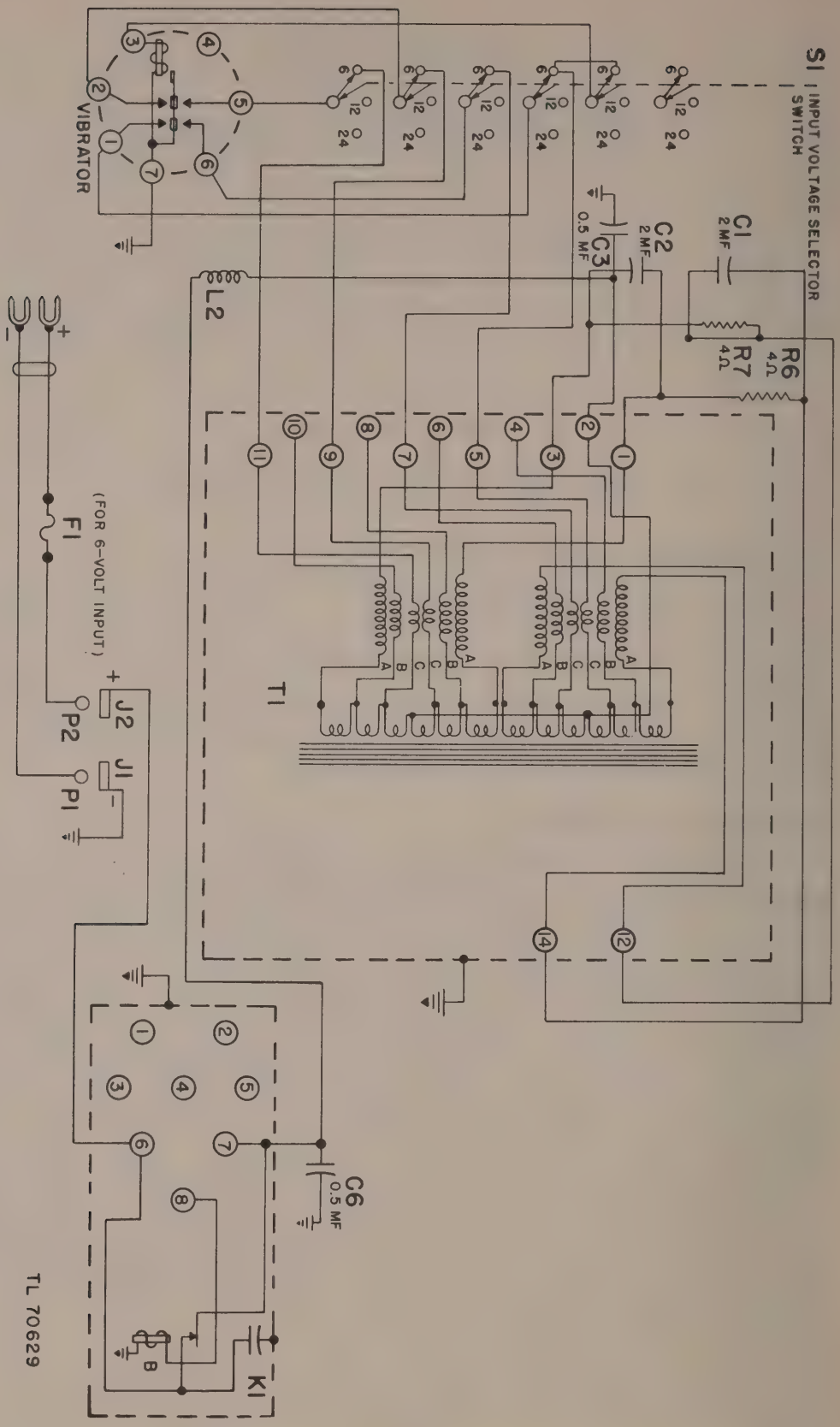


Figure 10. Functional diagram of 6-volt input.

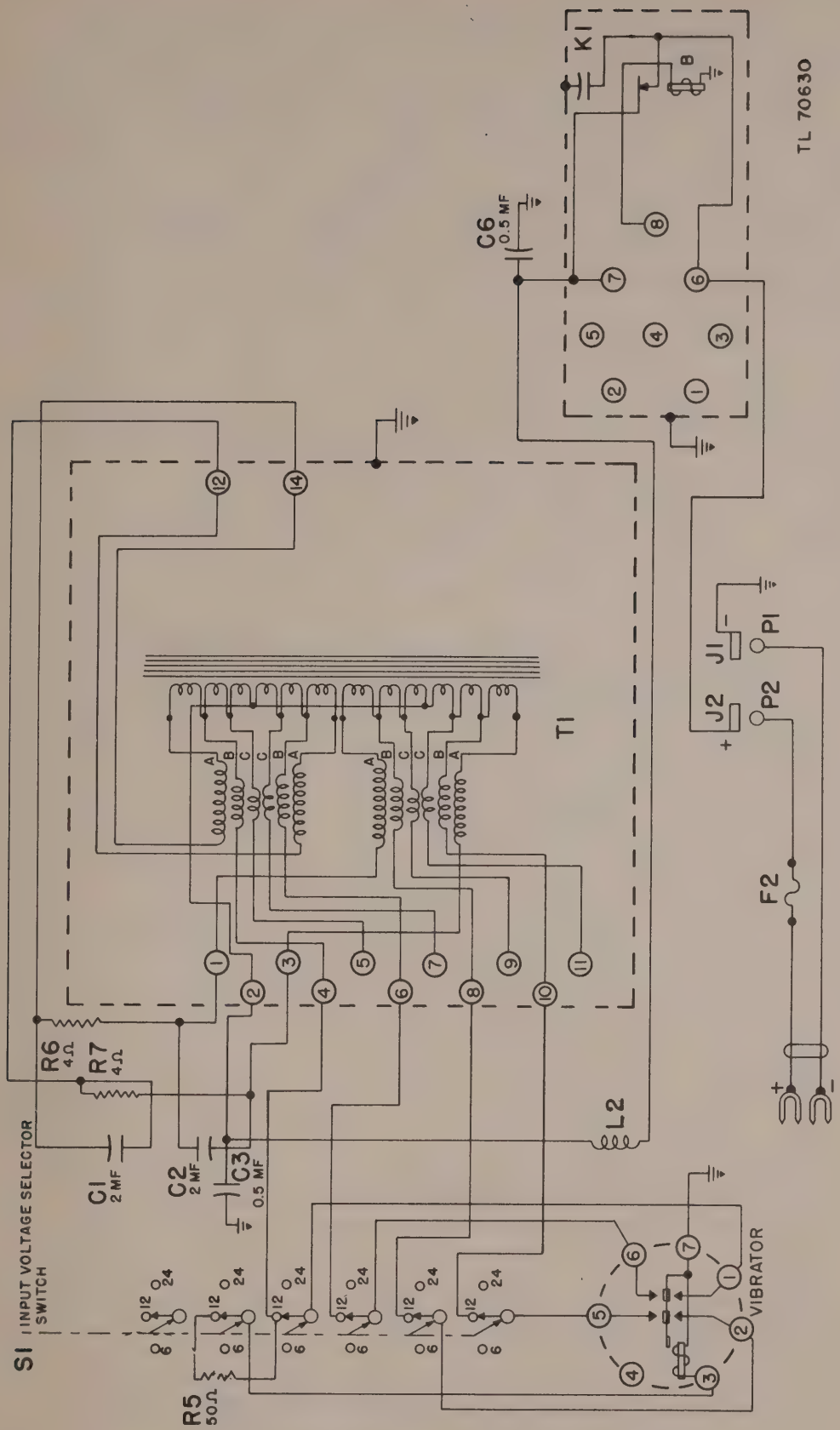


Figure 11. Functional diagram of 12-volt input.

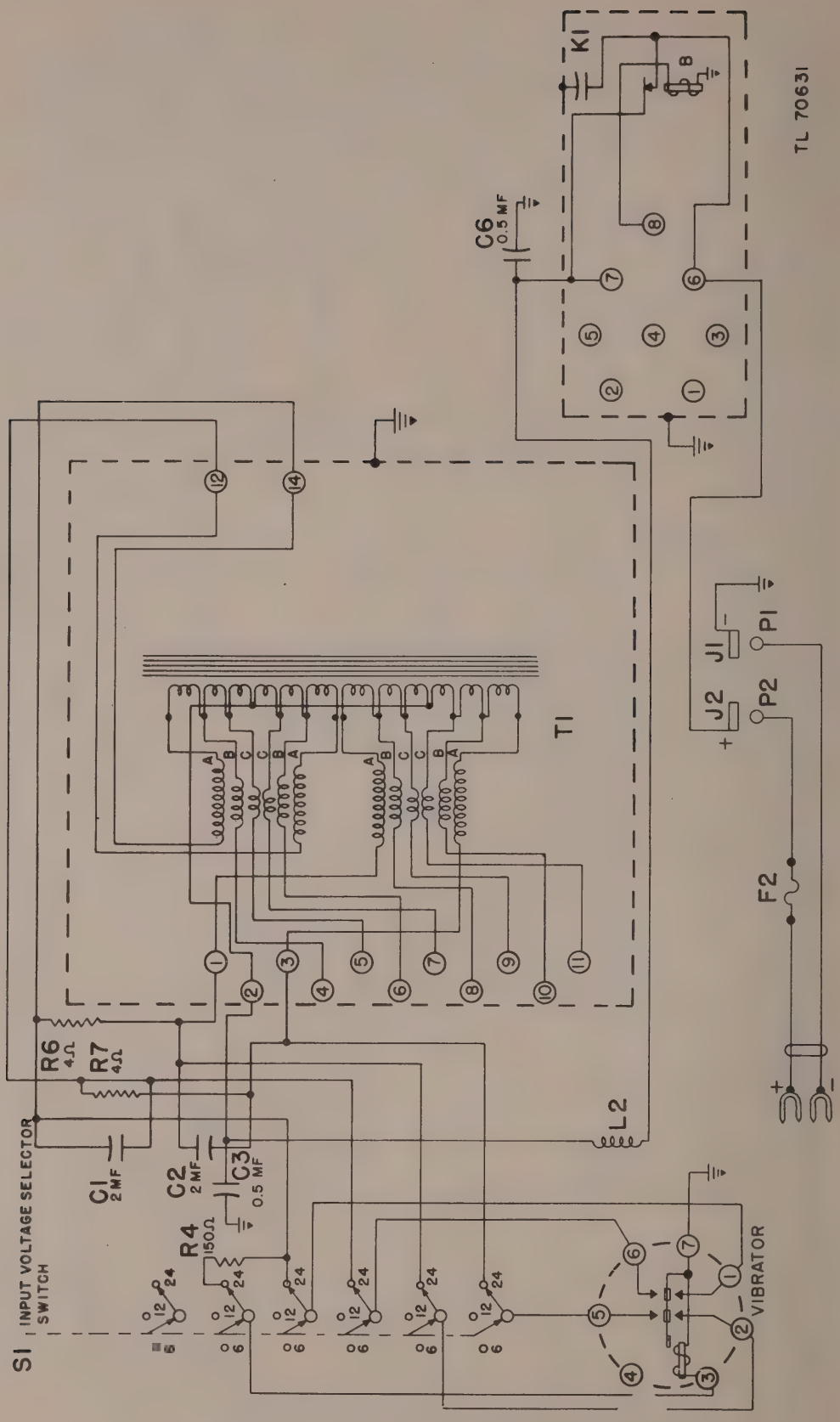


Figure 12. Functional diagram of 24-volt input.

b. The primary circuits on 6-, 12-, and 24-volt operation are shown in figures 10, 11, and 12 respectively. Selection of the proper primary windings is performed by switch S1. Resistors R4 and R5 are voltage-dropping resistors to provide 6 volts to the vibrator driving coil when using a 12- or 24-volt supply. Capacitors C3 and C6, together with choke L2, form the r-f (radio-frequency) filter for the input circuit. Buffer capacitors C1 and C2 are connected across the primary of the transformer to provide virtual neutralization of the effect of the inductive reactance of the transformer. This reduces the effective voltage at the vibrator contacts when the contacts open and close, thus prolonging vibrator contact life by eliminating electrolytic transfer (transfer of metal from one contact to another without necessarily arcing) and erosion. Resistors R6 and R7 are connected across the ends of the transformer primaries which are normally at the same instantaneous potential. Their effect is to equalize potentials during abnormal surge or transient conditions. These potentials might otherwise damage the contacts. Air inductors A, B, and C in the primary of transformer T1 act as current dividers for the contacts of the vibrator. In effect, the contacts are in parallel in the primary circuit. If one contact were to close slightly before the other, the contact would be damaged because the entire current would be drawn by the one contact. To prevent this damage, inductors A, B, and C have been added. The inductors delay the current slightly in the side of the circuit which contains the contact that closes first. As the first contact closes, the current starts to build up slowly, instead of instantaneously, because of the effect of the inductor. Before the current has reached its peak, the other contact will have closed, thereby causing current to build up through it. In this way the current is divided between the two contacts. These inductors are sealed within, and are part of, transformer T1.

30. SECONDARY CIRCUIT.

The secondary circuits are shown in figures 13 and 14. The power transformer circuit is designed to provide constant voltages over a relatively wide range of input voltage for any given value of rated input.

a. Tank capacitor C4 functions as a part of this regulating circuit which operates on the principle of magnetic saturation. The entire secondary system of the transformer operates at a high flux density approaching saturation so that relatively large changes in magnetizing force (primary voltage or load current) tend to produce only very slight changes in secondary voltage. This condition of high density in the secondary magnetic circuit

is achieved by loading the high-voltage secondary (D1,E1,E2,F) with a large amount of reactive power. A high-quality, low power-factor capacitor, C4, is connected across a portion of the high-voltage secondary winding so that the a-c voltage across this portion, applied to the capacitor, will result in a circulating current, through the winding and capacitor only, determined entirely by the value of the voltage itself, the operating frequency and the value of the capacitor.

b. Windings D2 and D3 (fig. 13) are bucking coils on the high-voltage secondary; windings H3 and H4 (fig. 14) are the low-voltage filament bucking coils. Bucking coils are connected in series with secondary windings which require close regulation. They are designed to provide approximately 20 percent of the voltage through the associated secondaries and are so connected as to oppose the instantaneous secondary voltage. Variations in primary magnetization, due to changes in applied input voltage or to changes in load current, affect the voltage in these windings and hence the degree of bucking in such a manner as to provide substantially constant output voltage. Winding G is the filament winding for tubes V1 and V2.

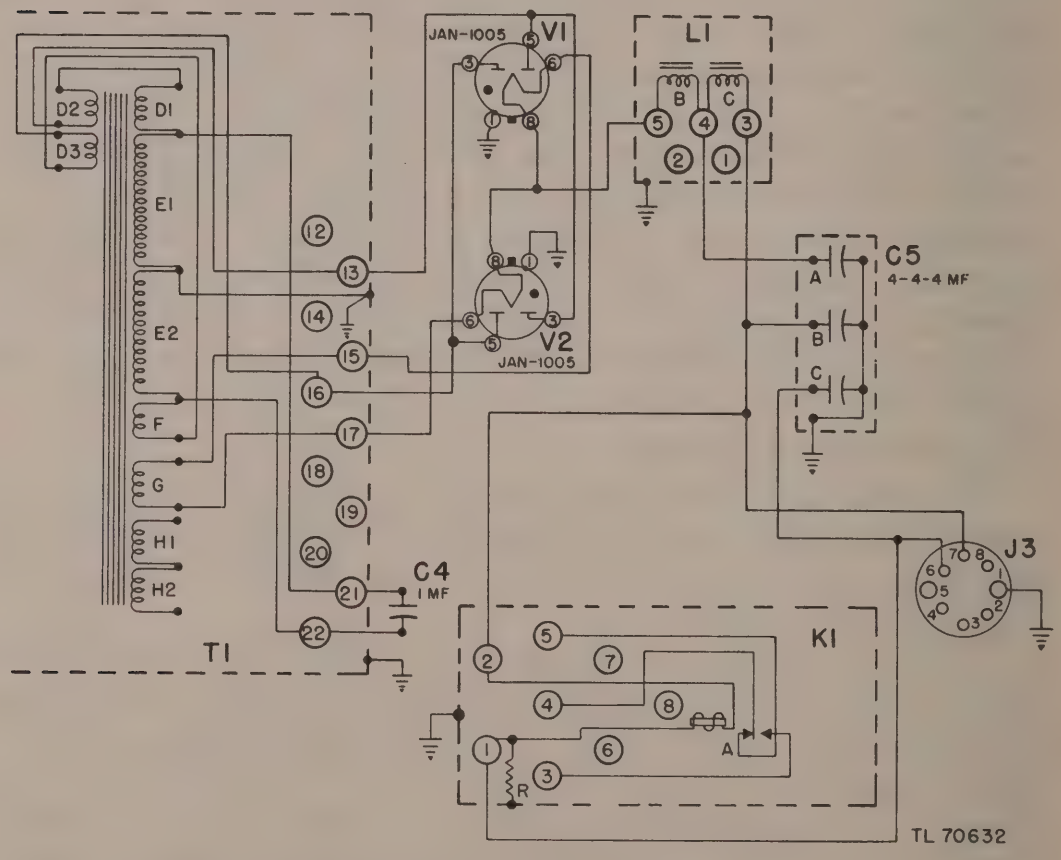


Figure 13. Functional diagram of high-voltage output circuit.

c. The high-voltage plate supply is rectified by means of two gaseous rectifier tubes V1 and V2 whose plates are connected in parallel. The heaters of these tubes are connected in series to the rectifier filament supply G. High-voltage direct current is taken from the midconnection of the two tube heaters through two audio filter chokes L1B and L1C. The audio ripple filter in this circuit consists of these two chokes and capacitors C5A and C5B, connected to form a choke-input filter. The output of the filter system is connected directly to the output socket to provide the high B supply to the radio set. A voltage divider is provided by connecting a high resistance relay coil (K1A) in series with a 10,000-ohm resistor (K1R) to ground. The connection between the relay coil and the resistor provides the low B output, and is further filtered by capacitor C5C. The relay coil and resistor are both sealed within the relay K1.

d. Windings H1 and H2 (fig. 14) of transformer T1 are the filament voltage supply windings for the radio set. The low voltage is grounded through rectifier CR1. The positive side of the filament voltage passes through audio choke L1A, through cut-out relay K1A, and on to connector J3. Capacitor C7 is an audio ripple filter for the filament circuit. Capacitor C8 acts as an r-f filter.

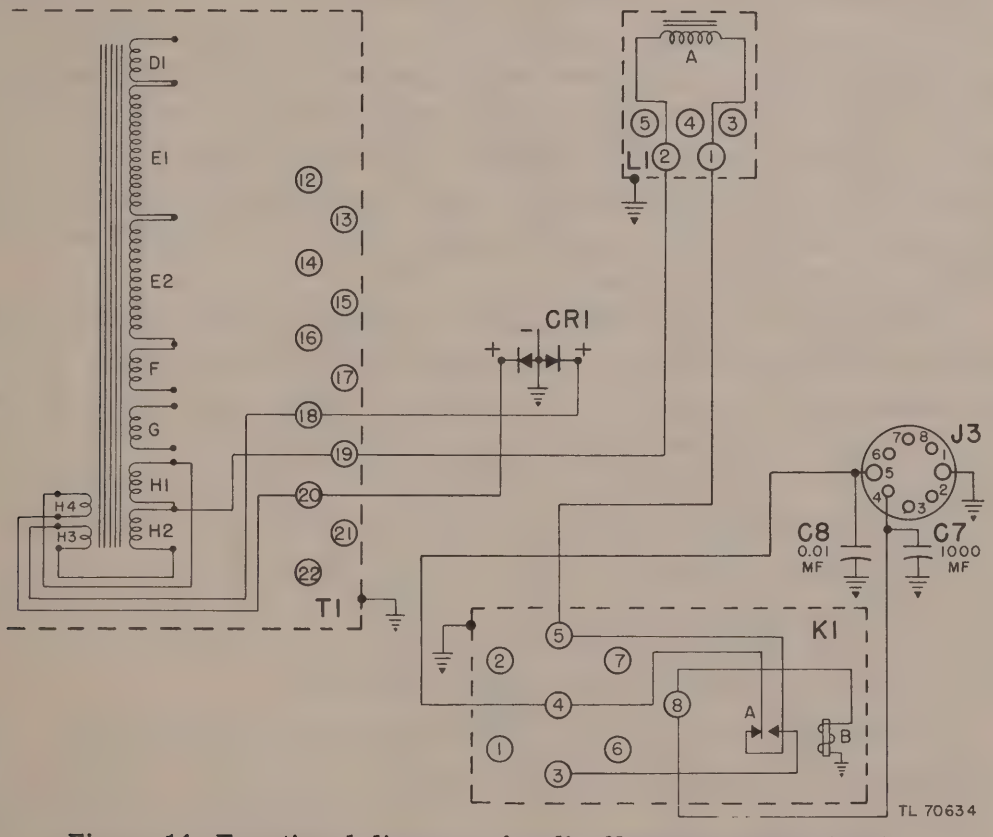


Figure 14. Functional diagram of radio filament supply circuit.

31. AUTOMATIC STARTING CIRCUIT (fig. 15).

a. Automatic operation of Vibrator Power Supply PP-114/VRC-3 is provided by using the filament current of Radio Receiver and Transmitter BC-1000-( ) to operate the starting relay.

b. Voltage at the positive terminal of the input cable is fed through one of three series resistors, R1, R2, or R3 (according to the position of the input voltage selector switch) to terminal 3 on relay assembly K1. At this point the voltage passes through the normally closed contacts of cut-out relay K1A and out on terminal 4 to pin 5 of the output socket. The filaments of Radio Receiver and Transmitter BC-1000-( ) are connected between pin 5 and ground in series with the off-on switch of the receiver and transmitter. The filaments draw current at approximately their normal rated voltage through the series resistor circuit when the radio set is turned on.

c. When the set is turned on, this filament voltage also appears at pin 4 on the output socket. The voltage is then applied to terminal 8 on relay assembly K1, where it passes through the starting relay coil and returns to the ground. Thus the coil of starting relay K1B is effectively in parallel with the filament of the radio set, and the relay is operated when the set is turned on. Closing of the starting relay contacts provides a path for current to flow from the positive input terminal through terminal 6 on the relay assembly, through the closed relay contacts and out of terminal 7 to the input filter choke L2, and from there to the center connection of the two multiple primary windings on the power transformer. The primary circuit is completed from the transformer primaries, through the input voltage selector switch S1 and the vibrator contacts to ground.

d. With the vibrator thus placed in operation, the transformer supplies voltage through the rectifier Tubes JAN-1005 to the high-voltage d-c output. The voltage divider, consisting of the cut-out relay coil and bleeder resistor described above is connected in this high-voltage output circuit. As soon as sufficient voltage is developed across the cut-out relay coil (terminals 1 and 2 on relay assembly K1) to operate this relay, the filament supply of the radio set is transferred from the series resistor arrangement used in starting to the regulated rectifier and filtered output of the power supply (fig. 15).

e. The time delay between operation of the starting relay and the cut-out relay is normally from ½ to 2 seconds. During this delay period, the radio set filaments are being operated through the series resistor arrangement directly from the applied input

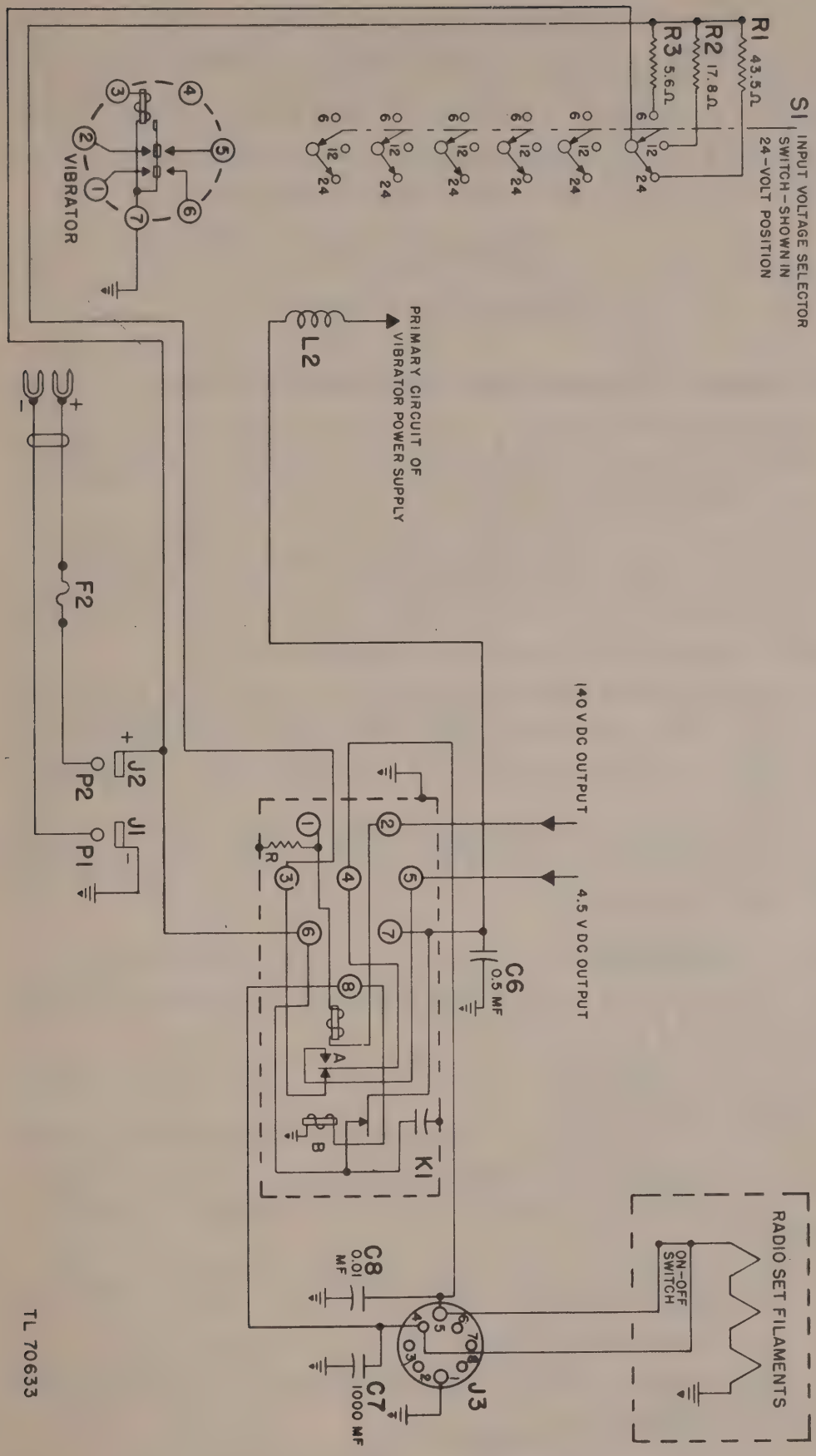


Figure 15. Functional diagram of automatic starting circuit.

voltage. The regulation of this arrangement, however, is not good enough to provide normal filament voltage and long tube life under the necessary variable conditions of input voltage for continuous operation. It is for this reason that the change-over is provided so that the filaments are operated from the well regulated output of the power supply, except when starting.

SECTION XI
TROUBLE SHOOTING

32. GENERAL TROUBLE-SHOOTING INFORMATION.

CAUTION: If the radio set does not operate when the ON-OFF switch is at ON, turn the set off immediately, and check the power supply.

a. Any failure of Vibrator Power Supply PP-114/VRC-3 to function properly will generally be due to failure of the vibrator or the rectifier tubes. These should be checked and replaced before proceeding to more complicated servicing.

b. Failure of the vibrator will always result in a blown fuse. If the fuse blows repeatedly, the vibrator should be replaced. In any case, the vibrator should be replaced after 500 hours of operation.

c. Tube failure will not cause a blown fuse, but will prevent operation of the radio set. The tubes should be replaced after 500 hours of operation.

33. TEST EQUIPMENT.

a. The following meters are required for testing Vibrator Power Supply PP-114/VRC-3.

(*1*) D-c voltmeters, 1,000 ohms per volt; ranges: 0 to 10 volts and 0 to 200 volts.

(*2*) A-c voltmeters, 200 ohms per volt (minimum); ranges: 0 to 50 volts and 0 to 500 volts.

(*3*) Ohmmeter to measure resistance between 0.1 ohms and 10,000 ohms.

b. To construct a dummy load proceed as outlined below.

(*1*) Receive condition:

(*a*) Short-circuit pins 4 and 5 on connector J3.

(*b*) Connect 15-ohm resistor between pin 5 and ground. This is the filament load.

(*c*) Connect 3,000-ohm resistor between pin 6 and ground.

(*2*) Transmit condition:
(*a*) Short-circuit pins 4 and 5.
(*b*) Connect 9-ohm resistor between pin 5 and ground.
(*c*) Connect 3,000-ohm resistor between pin 6 and ground.
(*d*) Connect 2,700-ohm resistor between pin 7 and ground.
(*3*) See paragraph 3 for output voltages.

34. TROUBLE-SHOOTING PROCEDURES.

a. Resistance Tests. A defective component in the circuit may be located by the following point-to-point resistance readings. Allow a tolerance of ±20 percent on all readings. Refer to the schematic diagram (fig. 22).

Test points	*Meter reading (in ohms)*	*Circuit*	*Corrective measure*
Transformer T1, terminal 21 to 22	5.7	Transformer secondary and capacitor C4	If shorted, disconnect wire from terminal 22 and recheck. If still shorted, replace transformer. If not, replace capacitor C4.
Transformer T1, terminal 13 to 16	23.5	Transformer secondary	
Transformer T1, terminal 12 to 14	2.4	Transformer primary and capacitor C1	If shorted, disconnect capacitor lead from terminal 12 and recheck. If still shorted, replace transformer. If not, replace capacitor C1.
Transformer T1, terminal 1 to 3	2.4	Transformer and capacitor C2	If shorted, disconnect capacitor lead from terminal 3 and recheck. If still shorted, replace transformer. If not, replace capacitor C2.
Choke L1, terminal 1 to 2	0.33	Filament choke	If defective, replace complete assembly.
Choke L1, terminal 3 to 4	55	Plate choke	If defective, replace complete assembly.
Choke L1, terminal 4 to 5	55	Plate choke	If defective, replace complete assembly.
Relay K1, terminal 1 to ground	10,000	Bleeder resistor in relay assembly	If defective, replace complete assembly.
Relay K1, terminal 1 to 2	1,450	Cut-out relay coil	If defective, replace complete assembly.
Relay K1, terminal 8 to ground	16	starting relay coil	If defective, replace complete assembly.

b. Typical Operating Voltages. At receive load with an input of 6.3, 12.6, or 25.2 volts direct current, the following typical operating voltages should be obtained:

Test points	*Meter readings*
Transformer T1, terminal 13 to ground	180 volts ac
Transformer T1, terminal 16 to ground	180 volts ac
Transformer T1, terminal 13 to 16	300 volts ac
Transformer T1, terminal 21 to 22	300 volts ac
Transformer T1, terminal 20 to 18	12.1 volts ac
Transformer T1, terminal 15 to 17	12.1 volts ac
Transformer T1, terminal 12 to 14	45 volts ac
Transformer T1, terminal 1 to 3	45 volts ac
Tube V1, terminal 8 to ground	152.5 volts dc
Choke L1, terminal 4 to ground	150 volts dc
Choke L1, terminal 3 to ground	147.5 volts dc
Choke L1, terminal 2 to ground	4.7 volts dc
Choke L1, terminal 1 to ground	4.6 volts dc
Connector J3, terminal 7 to ground	147.5 volts dc
Connector J3, terminal 6 to ground	92 volts dc
Connector J3, terminal 5 to ground	4.6 volts dc
Connector J3, terminal 4 to ground	4.5 volts dc

c. Improper Filament Voltage. Improper filament voltage at terminal 5 on connector J3 may be due to a faulty filter capacitor C7 or a faulty rectifier CR1, if transformer T1 and choke L1 are satisfactory.

d. Improper High B Voltage. Improper high B voltage at terminal 7 on connector J3 may be due to a faulty capacitor C5 or faulty tubes V1 and V2, if transformer T1 and choke L1 are satisfactory.

e. Improper Low B Voltage. Improper low B voltage at terminal 6 on connector J3 may be due to a faulty capacitor C5, tubes V1 or V2, the cut-out relay, or the bleeder resistor in the relay assembly K1.

SECTION XII
REPAIRS

35. REPLACEMENT OF PARTS.

a. Fuse. The fuse is mounted in a holder directly above the input cable on the outside of the case; spare fuses are located in a small compartment also mounted on the back of the outer case.

(*1*) Unscrew the cap marked FUSE. Remove defective fuse.

(*2*) Remove spare fuse compartment from mounting bracket by pulling up on the small clip which projects above the bracket. Although the compartment is fastened to the bracket with a chain, return it to its proper position as soon as possible

(*3*) Install new fuse and replace cap.

b. Vibrator. The vibrator is located on the top of the chassis as shown in figure 5.

(*1*) Remove the chassis from the outer case.

(*2*) The vibrator is of the plug-in type. Remove it by pulling it out of the socket.

(*3*) Plug in new vibrator.

c. Tubes. Tubes are located on the top of the chassis (fig. 5) and are held in position by two tube clamps.

(*1*) Loosen the wingnut which holds the tube clamp in place, and swing the clamps away from the tubes. The tubes may then be pulled out of the sockets.

(*2*) After replacing tubes, swing the clamps back into position over the tubes and fasten the wingnut.

d. Other Components. Other components will rarely have to be replaced. To replace any of them, check the wiring of the unit with the schematic diagram (fig. 22). Make sure that new parts are firmly mounted and that all connections are clean and secure. Refer to section IX for instructions on moistureproofing and fungiproofing new components and connections.

36. RUSTPROOFING AND REPAINTING.

When the finish on the case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces as follows:

a. Use #00 or #000 sandpaper to clean the surface down to the bare metal. Obtain a bright smooth finish.

> **CAUTION:** The use of steel wool, although permitting rapid removal of rust, is not recommended. Minute particles of steel wool frequently enter the case and cause harmful shorting or grounding of circuit.

b. When a touch-up job is necessary, apply paint with a small brush. When numerous scars and scratches warrant complete repainting, remove the vibrator power supply chassis and spray paint over the entire case. Remove rust from the case by cleaning corroded metal with dry-cleaning solvent. In severe cases it may be necessary to use dry-cleaning solvent to soften the rust, and sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations.

WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR (Technical service) Signal Corps — MATÉRIEL — DATE 15 March 45

FROM (Organization) 579 Sig Repair Co. — (Station) APO 101 — (Station) San Francisco, Cal.

TO (Next superior headquarters) Signal Officer Ninth Army. — (Technical service)

COMPLETE MAJOR ITEM

NOMENCLATURE: Vibrator Power Supply PP-114/VRC-3 — TYPE: Ground, vehicular

MODEL: — — MANUFACTURER: Electronic Laboratories Inc.

U. S. A. REG. NO.: Order No. 5991-Phila-45-10 — SERIAL NO.: 43 — DATE RECEIVED: 2 Feb 45

EQUIPMENT WITH WHICH USED (IF APPLICABLE): Radio Receiver and Transmitter BC-1000( )

NOMENCLATURE OF DEFECTIVE COMPONENT

PART NO.: S. C. stock No. 3DB1000-13 — TYPE: Capacitor (ref. symbol C7) fixed, 1000 mfd 10V DCW

MANUFACTURER: Electronic Laboratories Inc. — DATE INSTALLED: 14 Feb 45

LENGTH OF SERVICE

DATE OF INITIAL TROUBLE: 20 Feb 45

TOTAL TIME INSTALLED	YEARS	MONTHS	DAYS
	0	0	6

TOTAL PERIOD OF OPERATION BEFORE FAILURE (FILL IN WHERE APPLICABLE)

YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
—	—	—	40	—	—

DESCRIPTION OF TROUBLE AND PROBABLE CAUSE

GIVE TYPE OF FAILURE: MECHANICAL, ELECTRICAL, WORKMANSHIP, MATERIAL, DESIGN

Capacitor C7 shorts out due to humid operating conditions.

UNUSUAL SERVICE CONDITIONS

GIVE BRIEF DESCRIPTION

operation in tropics

TRAINING OR SKILL OF USING PERSONNEL (CHECK ONE): POOR — FAIR — GOOD ✓

DESCRIPTION OF ANY REMEDIAL ACTION TAKEN

Radio set has been given moistureproofing and fungiproofing treatment, 2 Mar 45

RECOMMENDATIONS

Substitution of capacitor designed for tropical operation.

1ST IND.

OFFICE — STATION — DATE

TO CHIEF (Technical service) Signal Officer, Washington 25, DC

NAME — RANK — STATION

ORIGINATING OFFICER

SIGNATURE: E. A. Wilson

NAME: E. A. WILSON

RANK AND TITLE: Capt. Sig C.

ORGANIZATION: 579 Sig Repair Co.

INSTRUCTIONS

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.

2. This form will be used for reporting manufacturing, design or operational defects in matériel with a view to improving and correcting such defects, and for use in recommending modifications of matériel.

3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.

4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (Change No. 3).

5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches or other illustrative material are highly desirable.

6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.

7. This form will be made out by using or service organizations and forwarded in duplicate through command channels to the chief of technical service. The office of the chief of technical service receiving the report will forward an information copy to the Commanding General, Army Ground Forces or Army Air Forces, whichever is applicable, and to the Commanding General, Army Service Forces.

8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
1 December 1943

16—37786-1 U. S. GOVERNMENT PRINTING OFFICE

TL70638

Figure 16. Unsatisfactory equipment report, sample form.

37. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468, should be filled out and forwarded through channels to the office of the Chief Signal Officer, Washington 25, D. C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

c. If either form is not available, Form No. 468 (fig. 16) may be reproduced, filled out, and forwarded through channels. When Army Air Forces Form No. 54 is required but unavailable, reproduce Form No. 468 and forward it through channels in accordance with directions on Form No. 468.

APPENDIX

SECTION XIII
MAINTENANCE PARTS

38. VIBRATOR POWER SUPPLY PP-114/VRC-3.

The following information was compiled on 27 February 1945. The appropriate sections of the ASF Signal Supply Catalog for Vibrator Power Supply PP-114/VRC-3 are:

Organizational Spare Parts

SIG 7-AN/VRC-3 when published.

Higher Echelon Spare Parts

Sig 8-PP-114/VRC-3 when published.

For the latest index of available catalog sections, see ASF Signal Supply Catalog SIG 2.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3E7264	CABLE ASSEMBLY, power: rubber jacketed; round, 0.497" diam; 124" lg; 2 No. 12 AWG copper braided shield cond each comprising 64 No. 30 strands; Electronic Labs No. A-1848; (with Zierick No. 118 term lug clincher type on one end, two Belden Diet soldering lug on either end); (radio power supply).
C8	3K3510314	CAPACITOR, fixed: mica; 10,000 mmf ±20%; 300 vdcw; max dimen 53/64" lg x 53/64" wd x 11/32" thk; CM35A103M.
C3, C6	3DA500-38.1	CAPACITOR, fixed: paper; 500,000 mmf ±10%; 50 vdcw; 1⅞" x $1\frac{3}{16}$" diam; Electronic Labs No. C-311; (r-f filter).
C4	3DB1.7662	CAPACITOR, fixed: paper; 1 mf ±10%; 330 vdcw; $3\frac{23}{32}$" x $1\frac{3}{16}$" x $1\frac{1}{16}$" thk; Fast No. 7662; Electronic Labs No. C-405; (tank).
C1, C2	3DB2.10939	CAPACITOR, fixed: paper; 2 mf +14% −6%; 150 vdcw; 2⅞" x $1\frac{3}{16}$" x $1\frac{1}{16}$" thk; Elec Utilities No. 10939; Electronic Labs No. C-415; (buffer).
C7	3DB1000-13	CAPACITOR, fixed: electrolytic; 1,000 mf; 10 vdcw; $2\frac{3}{16}$" x 1⅜" diam; Mallory No. SPO 36753-B; Electronic Labs No. C-274; (filter).
C5	3DB4-192	CAPACITOR, fixed: paper; 3-section; 4-4-4 mf +20% −0%; 600 vdcw; $3\frac{5}{16}$" x 2" x 4"; Capacitrons Inc. No. A-1049; Electronic Labs No. C-416; (filter).

38. VIBRATOR POWER SUPPLY PP-114/VRC-3 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
L1	3C323-35K	COIL ASSEMBLY, radio, AF: filter; single-winding; includes 3 coils, 2 at 200 max cur, 1 at 3 amp max cur; over-all dimen 2" lg x 3⅞" wd x 3 $\frac{7}{16}$" h; Electronic Labs No. TA-2685.
L2	3C323-35J	COIL, radio, RF: choke; single-winding, single-layer wound; unshielded; 30 turns No. 15 AWG wire; 1 $\frac{1}{16}$" lg x $\frac{7}{16}$" diam OD; Electronic Labs No. T-15.
J1, J2	2ZK5584	CONNECTOR, female contact: banana type; brass, nickel plated; ⅞" lg x ½" hex. head; Bud Rad No. PJ-963; Electronic Labs No. S-223.
P1, P2	2ZK7111.23	CONNECTOR, male contact: banana type; brass, nickel plated; $\frac{9}{32}$" diam x $\frac{11}{16}$" lg shaft; Electronic Labs No. S-221.
F1	3Z1921	FUSE FU-21: cartridge; 10-amp; glass; ferrule, ¼" diam x 1¼" lg over-all; Littelfuse No. 1081.
	3Z2878-1.4	HOLDER, fuse: extractor post; for single 3 AG fuse; 15-amp; 2⅜" lg x $\frac{11}{16}$" diam; Buss No. HKM-W; Electronic Labs No. S-498.
	3Z3286-2	HOLDER ASSEMBLY, fuse: steel; consists of 6 fuse clips for 3 AG type fuses; 6 rivets, 6 lockwashers; 2 $\frac{5}{16}$" lg x 2 $\frac{5}{32}$" wd x $\frac{9}{16}$" thk; Electronic Labs No. A-1823; (mounts with chain attached to unit).
	6L3708-32.3	NUT, wing: steel, zinc plated; $\frac{7}{16}$" h over-all x $\frac{13}{32}$" wd x $\frac{13}{16}$" wing spread; Electronic Labs No. U-753.
CR1	3H4859-62	RECTIFIER, metallic: selenium; input 7.4 v ac, 60 c; output 5.3 v dc −5% at 2.4 amp; 3⅝" x 3½" h x 1 $\frac{9}{32}$" thk; Benwood Linze No. 277S1; Electronic Labs No. H-212.
K1	2Z7598-62	RELAY ASSEMBLY: No. 1 starting and No. 2 output; including 1,000 mmf ±20% capacitor and 10,000 ohms ±10% bleeder resistor; No. 1 SPST normally open, No. 2 SPDT; 3 $\frac{15}{16}$" lg x 2 $\frac{1}{32}$" wd x 3 $\frac{13}{32}$" h; Electronic Labs No. A-1755.
R6, R7	3Z5994-33	RESISTOR, fixed: composition; 4 ohms ±10%; ½-w; ⅝" lg x $\frac{3}{16}$" diam; IRC No. BT ½.
R3	3Z5995F6-1	RESISTOR, fixed: wire-wound; 5.6 ohms ±5%; 5-w; 1" lg x $\frac{5}{16}$" diam; Ohmite ACAAB; Electronic Labs No. W-332.
R2	3Z6001G7-11	RESISTOR, fixed: wire-wound; 17.8 ohms ±5%; 5-w; 1" lg x $\frac{5}{16}$" diam; Ohmite ACAAB; Electronic Labs No. W-333.
R1	3Z6004C3-4	RESISTOR, fixed: wire-wound; 43.5 ohms ±2%; 5-w; 1" lg x $\frac{5}{16}$" diam x $\frac{3}{16}$" ID; Ohmite No. ACAAB; Electronic Labs No. W-331.

38. VIBRATOR POWER SUPPLY PP-114/VRC-3 (contd).

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
R5	3Z6005-145	RESISTOR, fixed: wire-wound; 50 ohms ±5%; 2-w; 7/8" lg x 5/16" diam; IRC type AA; Electronic Labs No. W-330.
R4	3Z6015-59	RESISTOR, fixed: wire-wound; 150 ohms ±10%; 10-w; 1¾" lg x 5/32" ID; Mallory No. IHJ; Electronic Labs No. W-279.
	2Z8677.91	SOCKET, tube: 7-prong, plate mtg type; filled bakelite; 1⅞" lg x 19/32" wd x 3/16" h over-all; Amphenol No. MIP-75-M; Electronic Labs No. S-503.
	2Z8650.4	SOCKET, tube: octal base; 1¾" lg x 1¼" wd x ⅞" h over-all; Ucinite No. 115001-2; Electronic Labs No. S-502.
J3	2Z8678.221	SOCKET, tube: 8-prong, plate mtg type; 2 3/16" lg x 1⅝" wd x 5/32" thk; Cinch No. 4039; Electronic Labs No. S-496.
S1	3Z9825-55.73	SWITCH, rotary: 6-pole; 3-position; single-section; aluminum body; 1 1/16" diam x 1 19/32" h over-all; (with term); Mallory No. S163-J revised; Electronic Labs No. E-137.
T1	2Z9614-129	TRANSFORMER, power: plate and filament; fully enclosed metal case; 6⅞" lg x 3¾" wd x 3 7/16" h; Electronic Labs No. TA-2680.
	3H6691-17	VIBRATOR, non-synchronous: input 6 v dc, 6½ amp; tubular aluminum case; 3¼" lg x 1½" diam; special laminated 7-prong wafer plug; Electronic Labs No. AA-1642.
	3G1838-8.16	WASHER, flat: bakelite, clear varnish fungus resisting; 9/64" ID x ½" OD x 1/32" thk; Electronic Labs No. U-1144.
	3G1838-10.21	WASHER, flat: bakelite, clear varnish fungus resisting; 0.039" ID x ⅝" OD x 0.031" thk; Electronic Labs No. U-1059.
	3G1838-9.17	WASHER, flat: bakelite, clear varnish fungus resisting; 13/64" ID x 9/16" OD x 1/32" thk; Electronic Labs No. U-1056.
	3G1838-10.20	WASHER, flat: bakelite, clear varnish fungus resisting; 0.203" ID x ⅝" OD x 0.062" thk; Electronic Labs No. U-1058.
	3G1838-10.22	WASHER, flat: bakelite, clear varnish fungus resisting; 0.390" ID x ⅝" OD x 0.062" thk; Electronic Labs No. U-1060.
V1, V2	2J1005	TUBE, electron: JAN-1005 (VT-195).

SECTION XIV
REFERENCES

39. PARTS LIST.

SIG 1	Introduction to ASF Signal Supply Catalogue (when published).
SIG 2	Complete Index to ASF Signal Supply Catalogue (when published).
SIG 3	List of Items for Troop Issue.
SIG 4-1	Allowances of Expendable Supplies.
SIG 4-2	Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5	Stock List of All Items.
SIG 6	Sets (when published).
SB 11-10	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

40. TECHNICAL MANUALS ON AUXILIARY EQUIPMENT AND TEST EQUIPMENT.

TM 11-2613	Voltohmmeter I-166
TM 11-2626	Test Unit I-176
TM 11-2627	Tube Tester I-177

41. SHIPPING INSTRUCTIONS.

U. S. Army Spec No. 100-14A	Army-Navy General Specification for Packaging and Packing for Overseas Shipment.

42. DECONTAMINATION.

TM 3-220	Decontamination.

43. DEMOLITION.

FM 5-25	Explosives and Demolitions.

44. CAMOUFLAGE.

FM 5-20	Camouflage, Basic Principles.

45. OTHER TECHNICAL PUBLICATIONS.

FM 21-6	List of Publications for Training.
FM 21-7	List of Training Films, Film Strips, and Film Bulletins.
FM 21-8	Defense Against Chemical Attacks.
FM 24-6	Radio Operator's Manual, Army Ground Forces.
FM 24-11	Combined Operating Signals.
FM 24-18	Radio Communication.

TB SIG 5	Defense Against Radio Jamming.
TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 66	Winter Maintenance of Ground Signal Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 143	Installation Instructions for Vehicular Radio Sets.
TM 1-455	Electrical Fundamentals.
TM 11-227	Signal Communication Equipment Directory, Radio Communication Equipment.
TM 11-310	Schematic Diagrams for Maintenance of Ground Radio Communication Sets.
TM 11-314	Antennas and Antenna Systems.
TM 11-453	Shop Work.
TM 11-454	The Radio Operator.
TM 11-455	Radio Fundamentals.
TM 11-462	Reference Data.
TM 11-483	Suppression of Radio Noises.
TM 11-637	Radio Set AN/VRC-3.
TM 37-250	Basic Maintenance Manual.

46. FORMS.

Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468.

47. ABBREVIATIONS.

a-c	alternating-current
d-c	direct-current
in.	inch(es)
kc	kilocycle(s)
lb	pound(s)
mc	megacycle(s)
r-f	radio-frequency

48. GLOSSARY.

Refer to the glossary in TM 11-455.

Order No. 43307—PHILA-45-10 18620 16 June 1945.

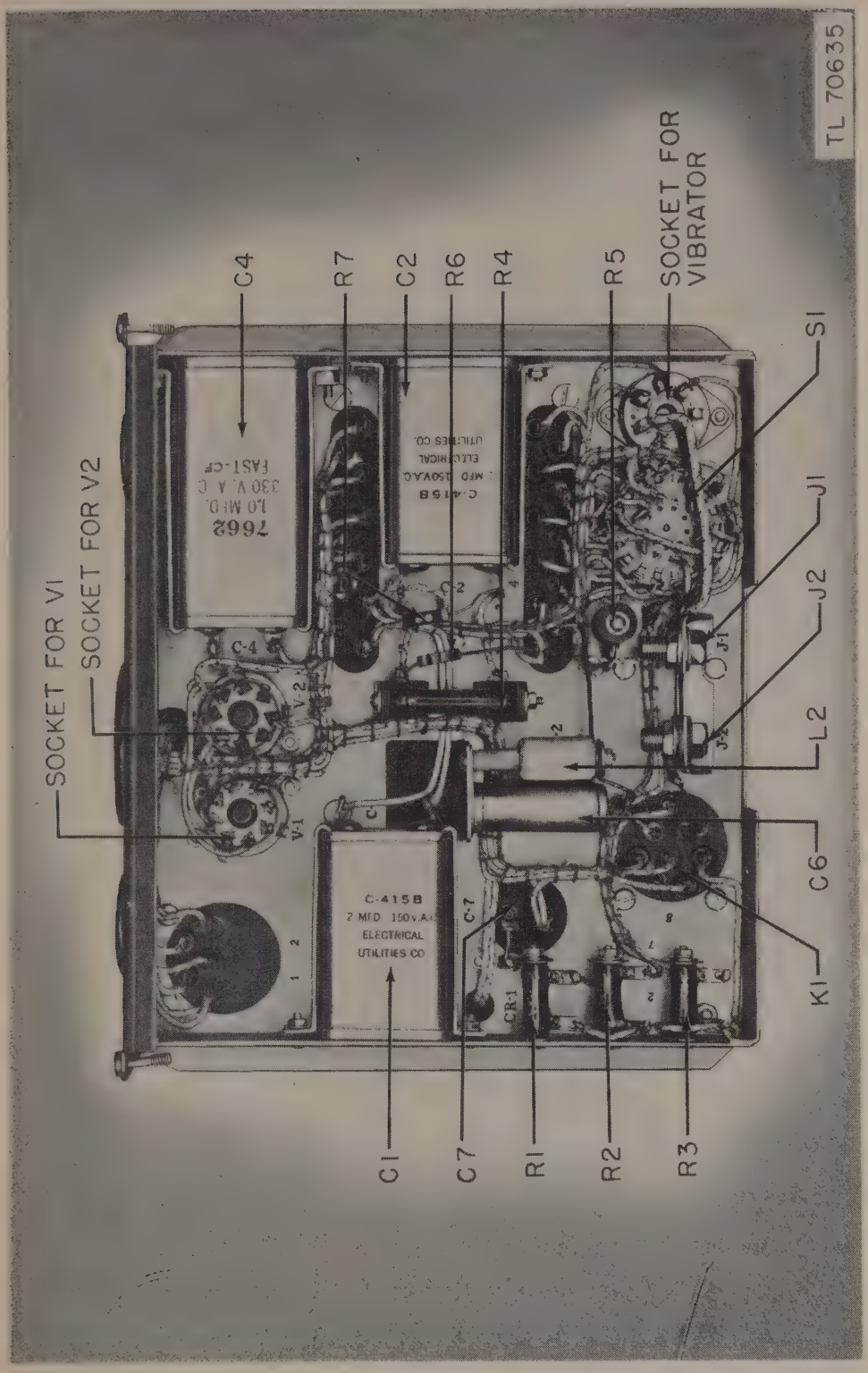


Figure 17. Bottom view of chassis.

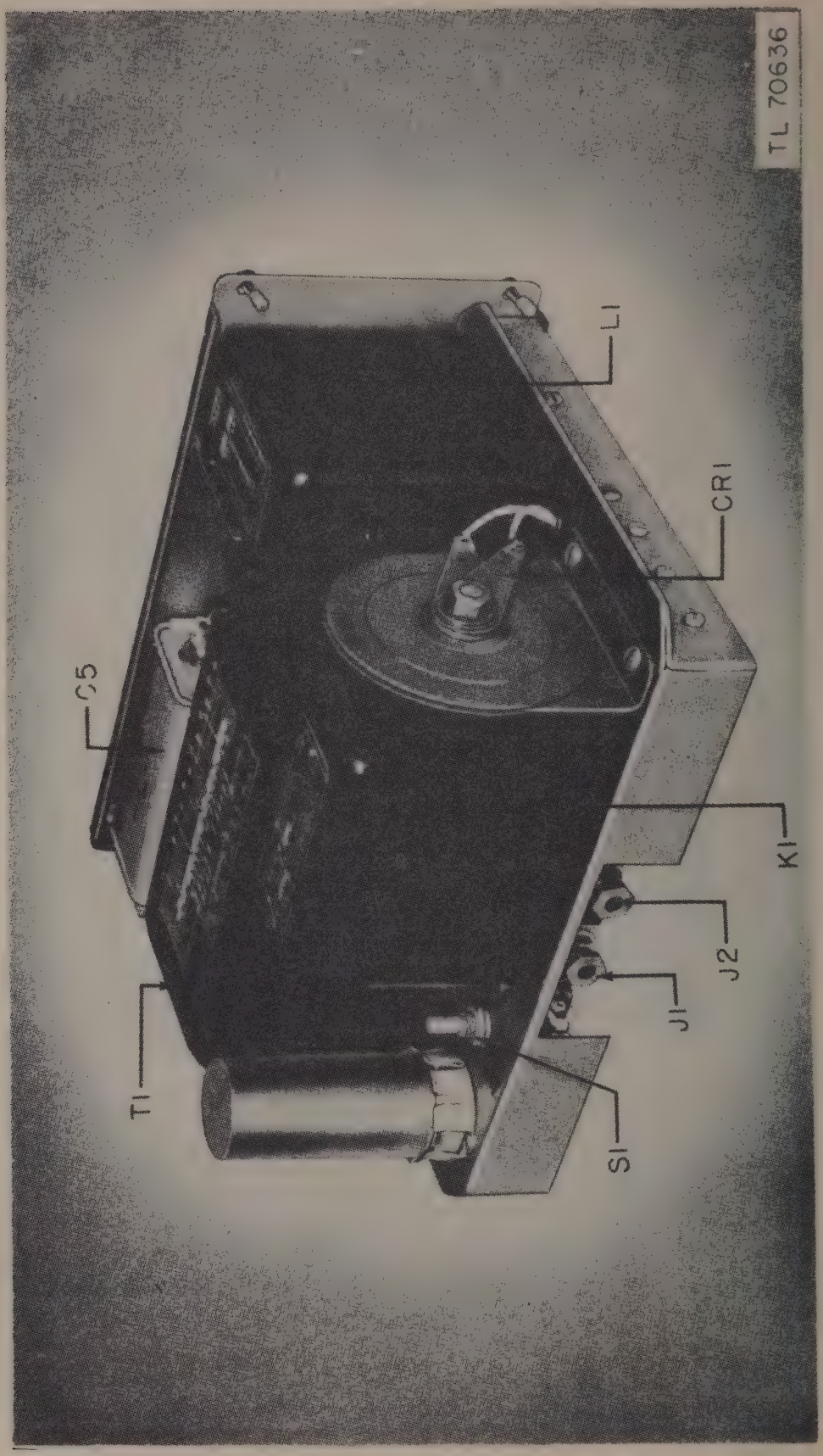


Figure 18. Back view of chassis.

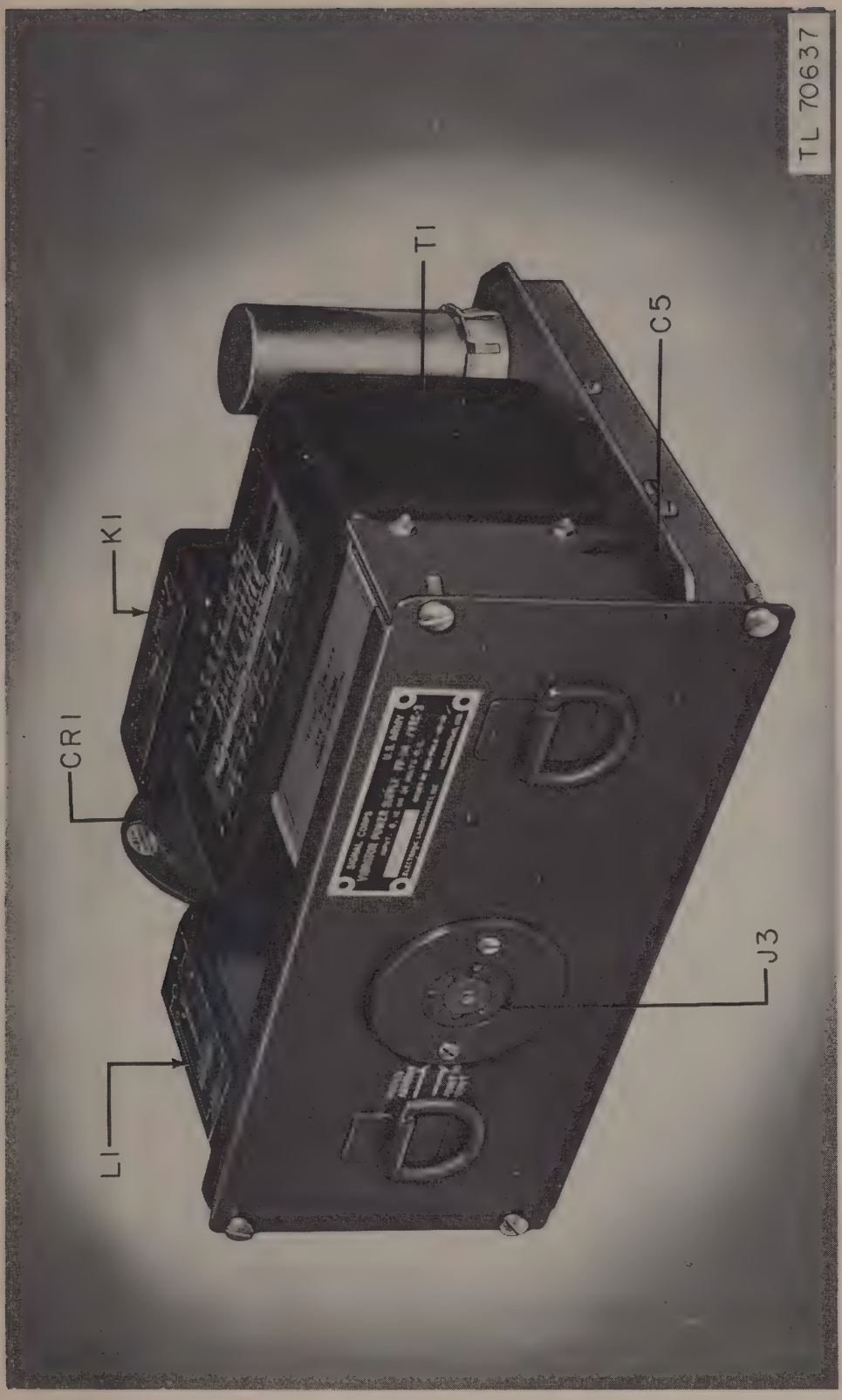
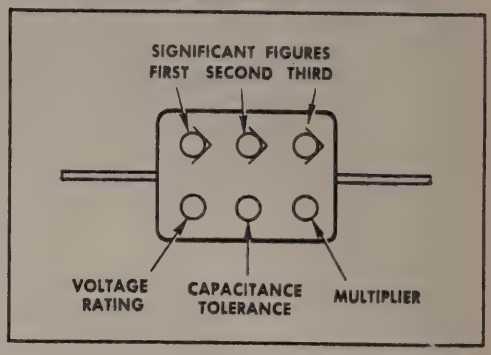


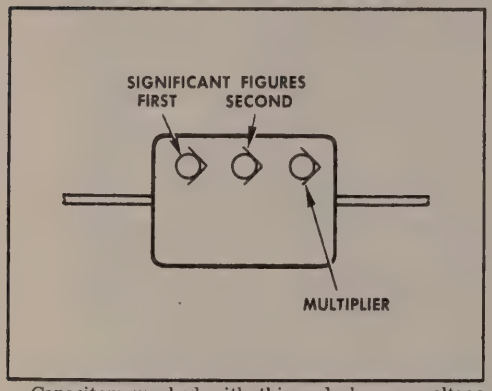
Figure 19. Front view of chassis.

CAPACITOR COLOR CODES

RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

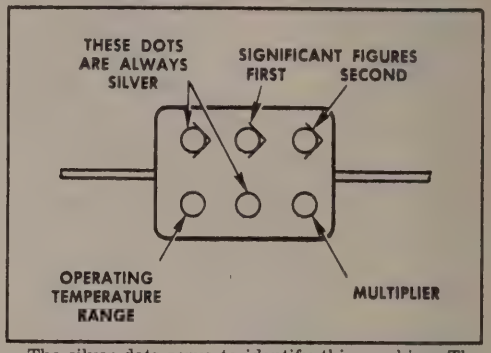


RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts.

AWS 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS

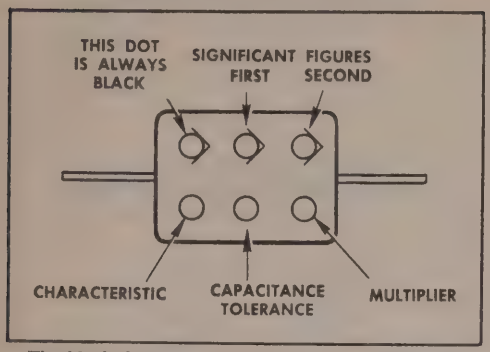


The silver dots serve to identify this marking. The sixth dot shows whether the capacitor has a maximum operating temperature of 167°F (black) or 185°F (brown).

COLOR	SIGNIFICANT FIGURE	MULTIPLIER		VOLTAGE RATING (VOLTS)	CHARACTERISTIC (AWS MICA-DIELECTRIC)
		RMA MICA- AND CERAMIC-DIELECTRIC AWS MICA- AND PAPER-DIELECTRIC	AWS CERAMIC-DIELECTRIC		
BLACK	0	1	1		A
BROWN	1	10	10	100	B
RED	2	100	100	200	C
ORANGE	3	1000	1000	300	D
YELLOW	4	10,000		400	E
GREEN	5	100,000		500	F
BLUE	6	1,000,000		600	G
VIOLET	7	10,000,000		700	
GRAY	8	100,000,000	0.01	800	
WHITE	9	1,000,000,000	0.1	900	
GOLD		0.1		1000	
SILVER		0.01		2000	
NO COLOR				500	

Figure 20. Capacitor color codes.

AWS 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



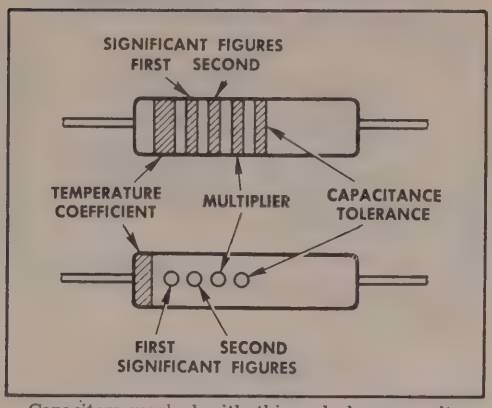
The black dot serves to identify the AWS marking. Capacitors marked with this code are rated at 500 volts, except the following. AWS type CM35 capacitors with capacitances of 6,800, 7,500, and 8,200 micromicrofarads, and AWS type CM40 capacitors with capacitances of 9,100 and 10,000 micromicrofarads are rated at 300 volts.

RMA: *Radio Manufacturers Association*

AWS: *American War Standard (American Standards Association)*

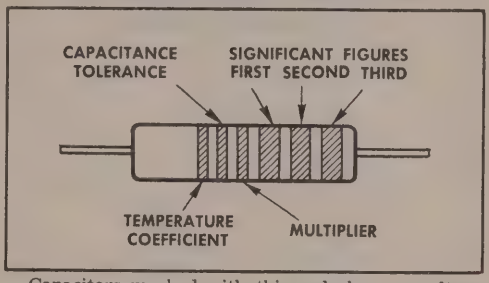
NOTE: These color codes give all capacitances in *micromicrofarads.*

AWS COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts.

RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts.

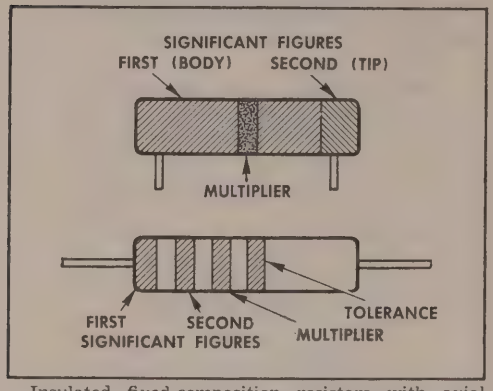
CAPACITANCE TOLERANCE				TEMPERATURE COEFFICIENT OF CAPACITANCE x10⁻⁶ MMF/MMF/°C
RMA & AWS MICA- AND PAPER-DIELECTRIC (PERCENT)	RMA CERAMIC-DIELECTRIC (PERCENT)	AWS CERAMIC-DIELECTRIC GREATER THAN 10 MMF (PERCENT)	AWS CERAMIC-DIELECTRIC LESS THAN 10 MMF (MMF)	
20	20	20	2.0	0
1	1	1		− 30
2	2	2		− 80
3	3	2.5	0.25	−150
4	4			−220
5	5	5	0.5	−330
6	6			−470
7	7			−750
8	2.5			+ 30
9	10	10	1.0	Not specified
5				
10				
20				TL 13417

TL-13417-2

Figure 20. Continued.

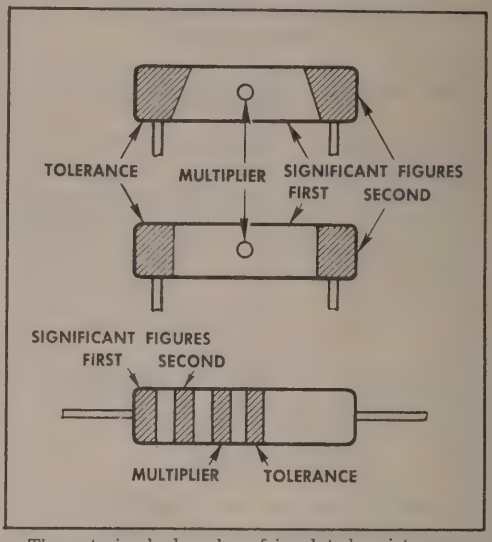
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



Insulated fixed composition resistors with axial leads are designated by a natural tan background color. Non-insulated fixed composition resistors with axial leads are designated by a black background color.

AWS COLOR CODE FOR FIXED COMPOSITION RESISTORS



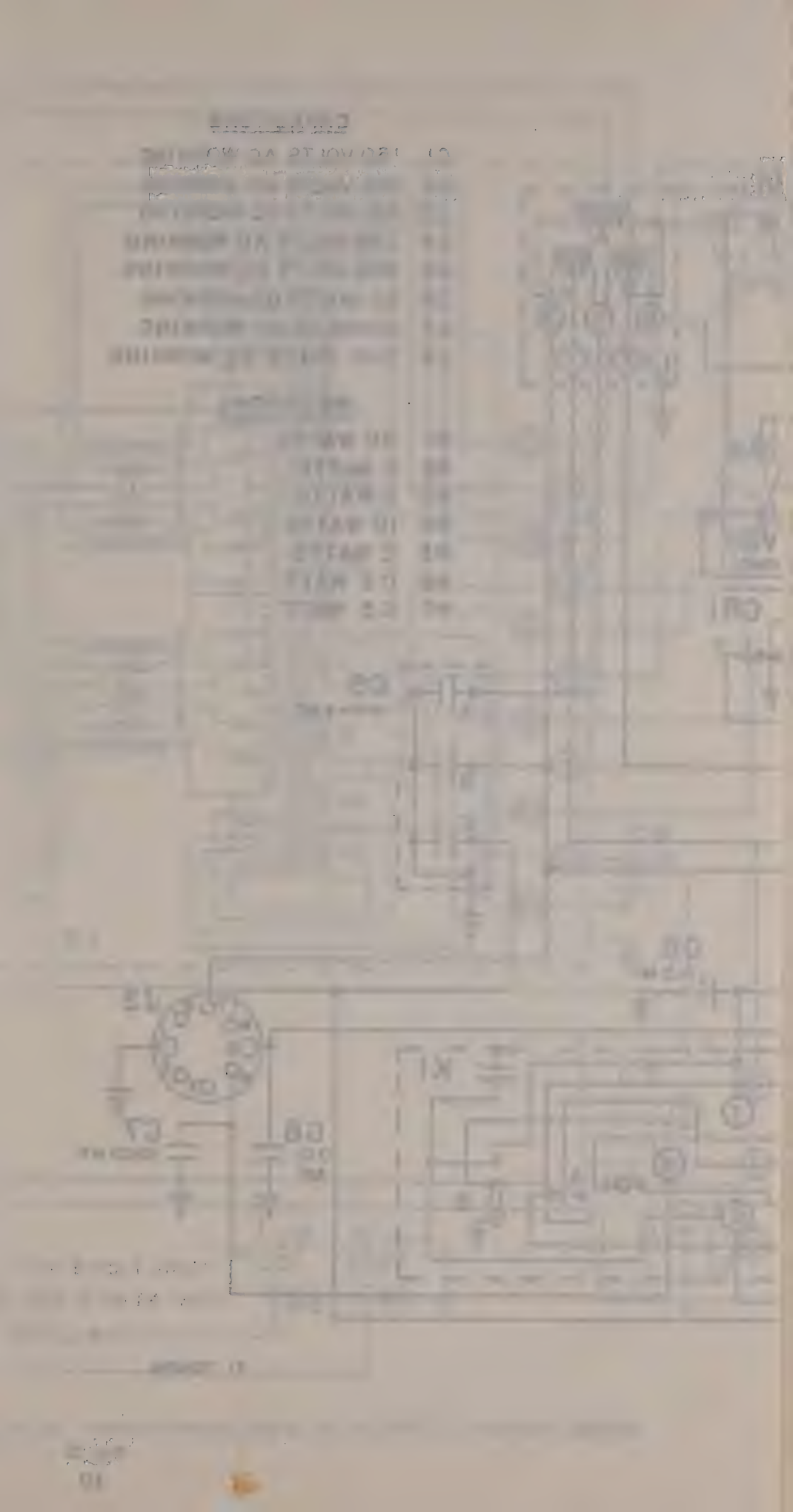
The exterior body color of insulated resistors may be any color except black. The usual color is natural tan. The exterior body color of uninsulated resistors with axial leads may be either black or white. The exterior body color of uninsulated resistors with radial leads may be black or it may be the color of the first significant figure of the resistance value.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	
RED	2	100	
ORANGE	3	1000	
YELLOW	4	10,000	
GREEN	5	100,000	
BLUE	6	1,000,000	
VIOLET	7	10,000,000	
GRAY	8	100,000,000	
WHITE	9	1,000,000,000	
GOLD		0.1	5
SILVER		0.01	10
NO COLOR			20

RMA: *Radio Manufacturers Association*
AWS: *American War Standard (American Standards Association)*

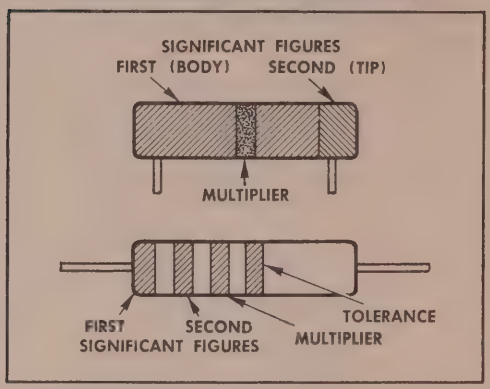
TL 13418

Figure 21. Resistor color codes.



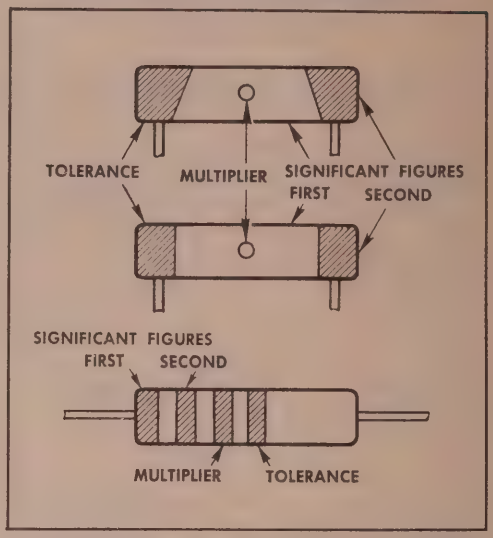
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



Insulated fixed composition resistors with axial leads are designated by a natural tan background color. Non-insulated fixed composition resistors with axial leads are designated by a black background color.

AWS COLOR CODE FOR FIXED COMPOSITION RESISTORS



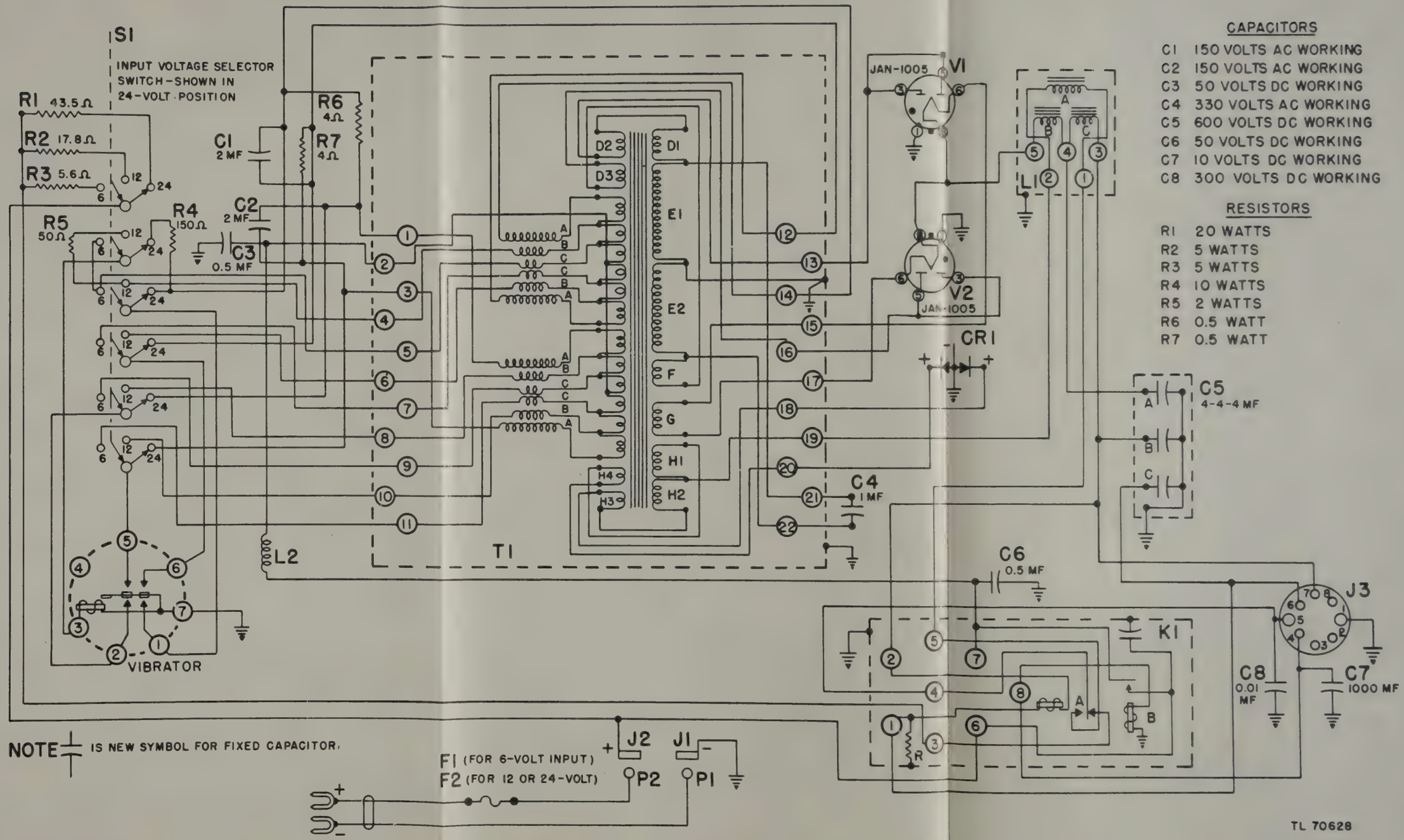
The exterior body color of insulated resistors may be any color except black. The usual color is natural tan. The exterior body color of uninsulated resistors with axial leads may be either black or white. The exterior body color of uninsulated resistors with radial leads may be black or it may be the color of the first significant figure of the resistance value.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	
RED	2	100	
ORANGE	3	1000	
YELLOW	4	10,000	
GREEN	5	100,000	
BLUE	6	1,000,000	
VIOLET	7	10,000,000	
GRAY	8	100,000,000	
WHITE	9	1,000,000,000	
GOLD		0.1	5
SILVER		0.01	10
NO COLOR			20

RMA: *Radio Manufacturers Association*
AWS: *American War Standard (American Standards Association)*

TL 13418

Figure 21. Resistor color codes.



CAPACITORS

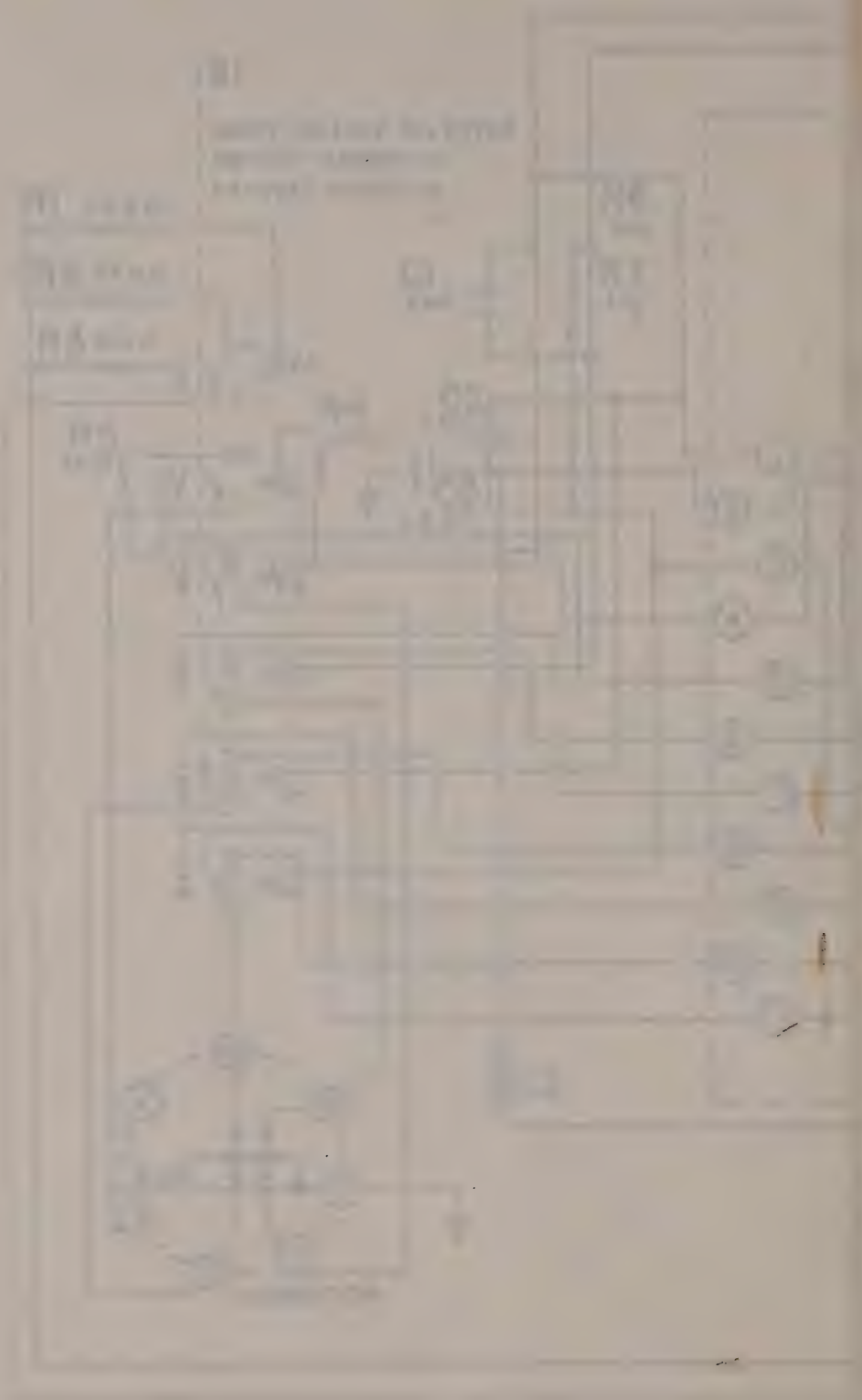
C1	150 VOLTS AC WORKING
C2	150 VOLTS AC WORKING
C3	50 VOLTS DC WORKING
C4	330 VOLTS AC WORKING
C5	600 VOLTS DC WORKING
C6	50 VOLTS DC WORKING
C7	10 VOLTS DC WORKING
C8	300 VOLTS DC WORKING

RESISTORS

R1	20 WATTS
R2	5 WATTS
R3	5 WATTS
R4	10 WATTS
R5	2 WATTS
R6	0.5 WATT
R7	0.5 WATT

797991 O - 48 (Face p. 48)

Figure 22. Vibrator Power Supply PP-114/VRC-3, schematic diagram.



Modifications of Vibrator Power Supply PP-114/VRC-3

SUPPLEMENT

to

TECHNICAL MANUAL TM 11-983

VIBRATOR POWER SUPPLY PP-114/VRC-3

27 FEBRUARY 1945

The following information, published on Order No. 5991-Phila-45-10, supplements TM 11-983, 27 February 1945.

Personnel using the equipment and having custody of this technical manual will enter suitable notations beside each affected paragraph and the figure in the TM to indicate the presence of this supplementary information.

This supplement will remain in effect only until the information is published in an official War Department publication.

Page 1. Paragraph 1c. Vibrator Power Supply PP-114/VRC-3.

(1) A new type snap fastener is used on the equipment covered by this supplement. These are similar in appearance to those supplied on earlier equipment, but are of a heavier and more durable type.

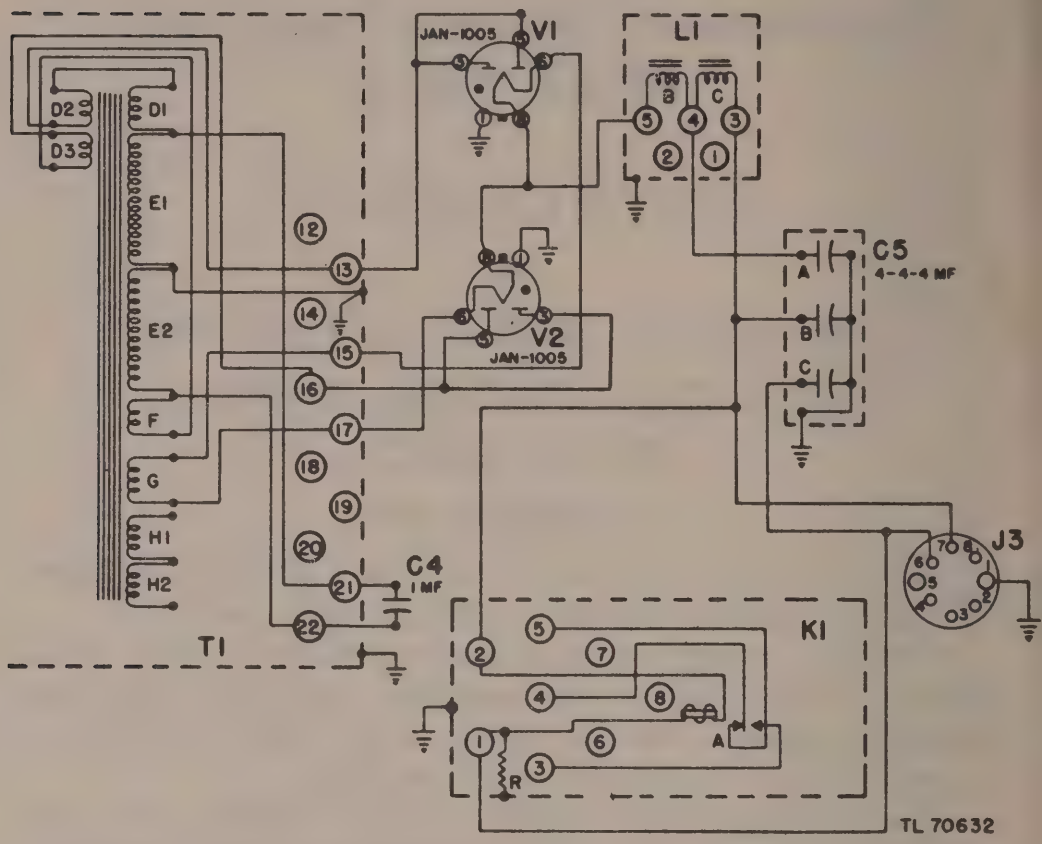
Page 7. Paragraph 6. Vibrator Power Supply PP-114/VRC-3.

(1) Two spare vibrators are included with each Vibrator Power Supply PP-114/VRC-3. These are packed in the corrugated carton with the vibrator power supply.

Page 20, Figure 8, and Page 43, Figure 17. Vibrator Power Supply PP-114/VRC-3.

(1) Physical location of the R1 and R2 resistors has been reversed. The wattage rating of the R1 resistor has been increased to 20 Watts and the physical size increased proportionately. R1 resistor is now mounted on a bracket in the position formerly occupied by the R2 resistor.

Page 28. Figure 13. Vibrator Power Supply PP-114/VRC-3.
The following figure replaces Figure 13 in TM 11-983.



Page 29. Paragraph 30c. Vibrator Power Supply PP-114/VRC-3.

(1) Change sentence, "The high-voltage plate supply is rectified by means of two gaseous rectifier tubes V1 and V2, *whose plates are connected in parallel,*" to, "The high-voltage plate supply is rectified by means of two gaseous rectifier tubes V1 and V2, *each connected as a half-wave rectifier.*"

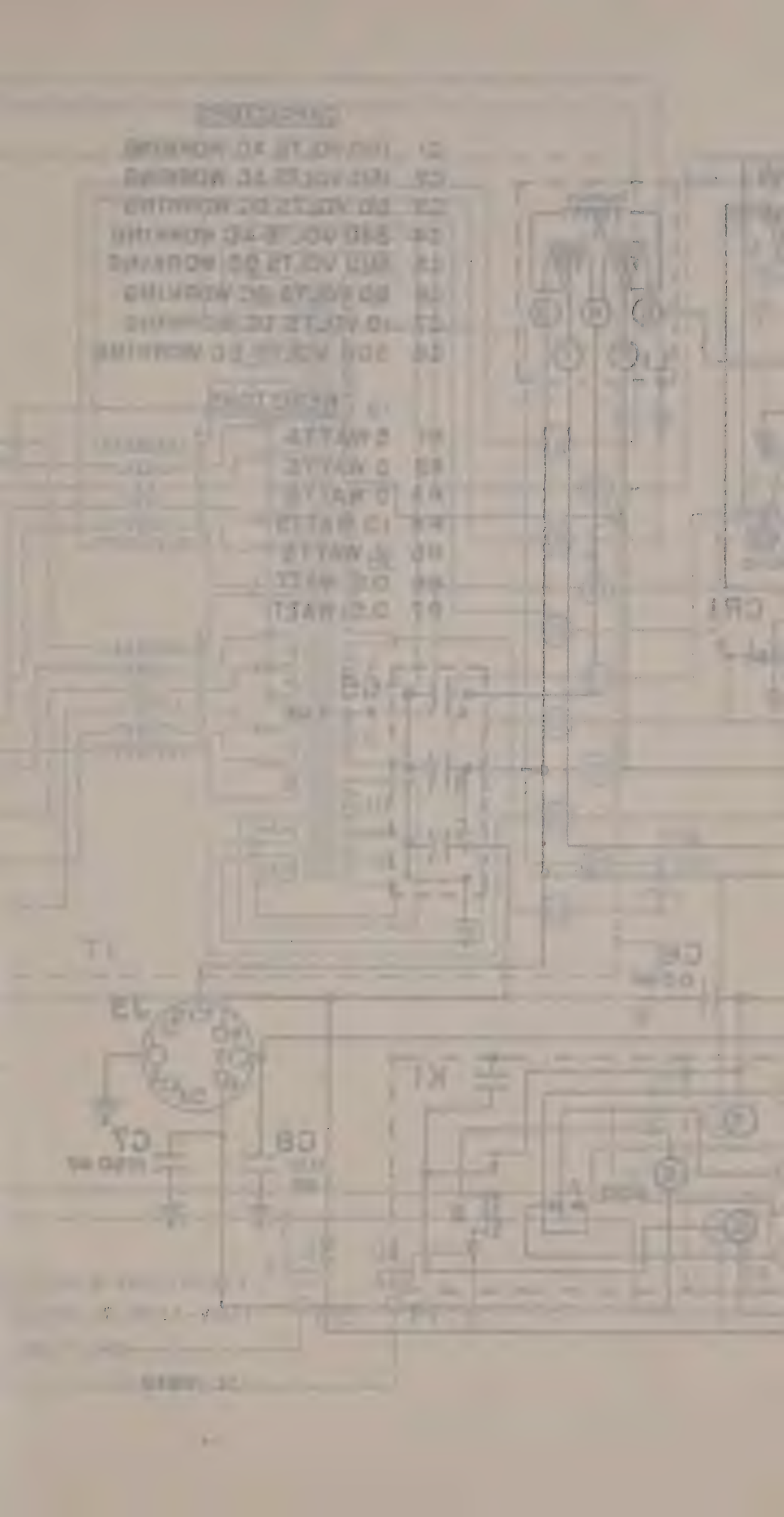
Page 39. Paragraph 38. Maintenance Parts
Vibrator Power Supply PP-114/VRC-3.

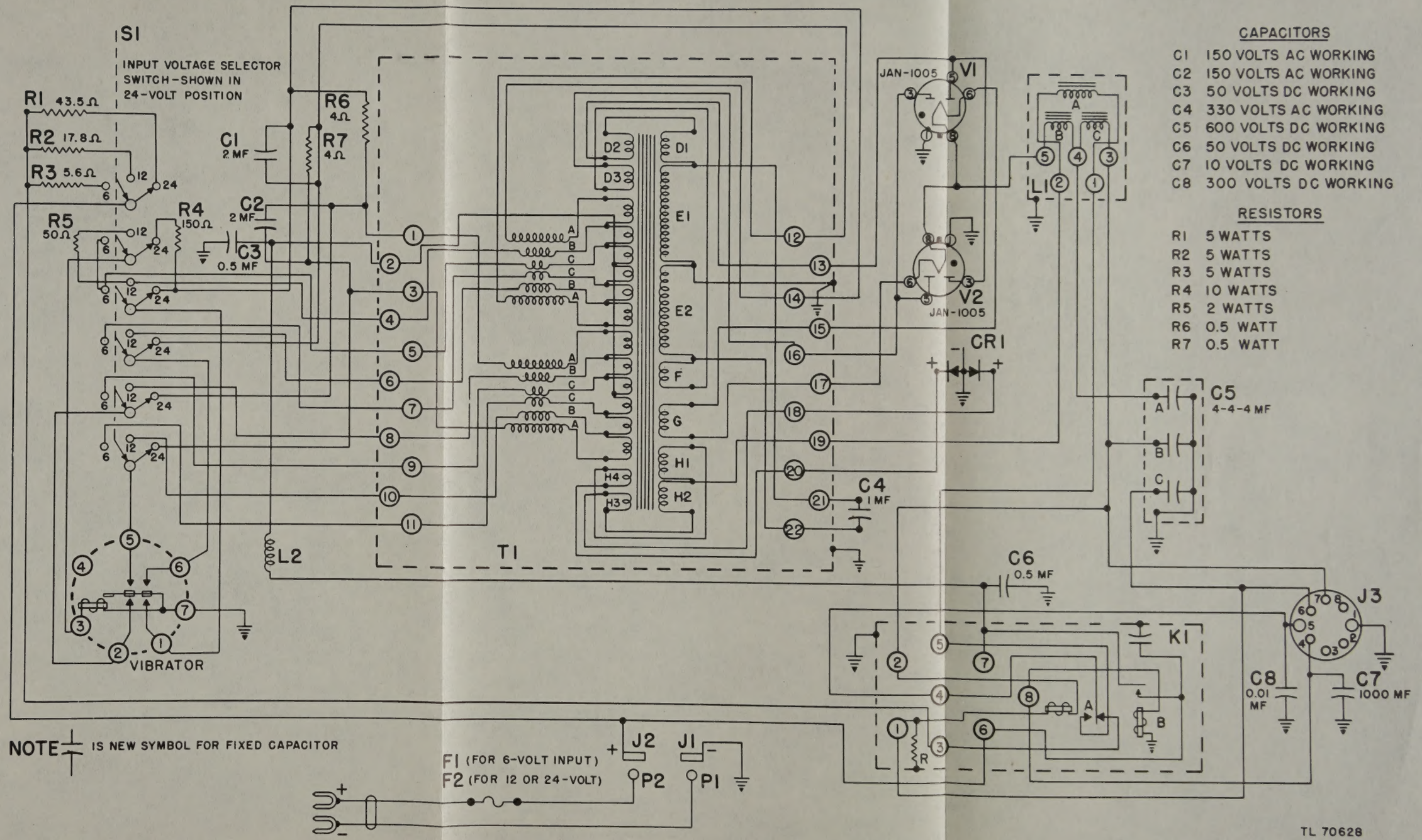
(1) Change description of resistors R6 and R7, ". . . IRC No. BT 1/2," to ". . . IRC No. BW 1/2."

(2) Change description of resistor R1 ". . . 5-w; 1" lg x 5/16" diam x 3/16" ID; Ohmite No. ACAAB; Electronic Labs No. W-331" to ". . . 20-w; 2" lg x 7/16" diam x 1/4" ID; Ohmite No. ACLOP; Electronic Labs No. W-331B."

Page 49. Figure 22. Vibrator Power Supply PP-114/VRC-3.

(1) The following figure replaces Figure 22 in TM 11-983.





CAPACITORS

C1	150 VOLTS AC WORKING
C2	150 VOLTS AC WORKING
C3	50 VOLTS DC WORKING
C4	330 VOLTS AC WORKING
C5	600 VOLTS DC WORKING
C6	50 VOLTS DC WORKING
C7	10 VOLTS DC WORKING
C8	300 VOLTS DC WORKING

RESISTORS

R1	5 WATTS
R2	5 WATTS
R3	5 WATTS
R4	10 WATTS
R5	2 WATTS
R6	0.5 WATT
R7	0.5 WATT

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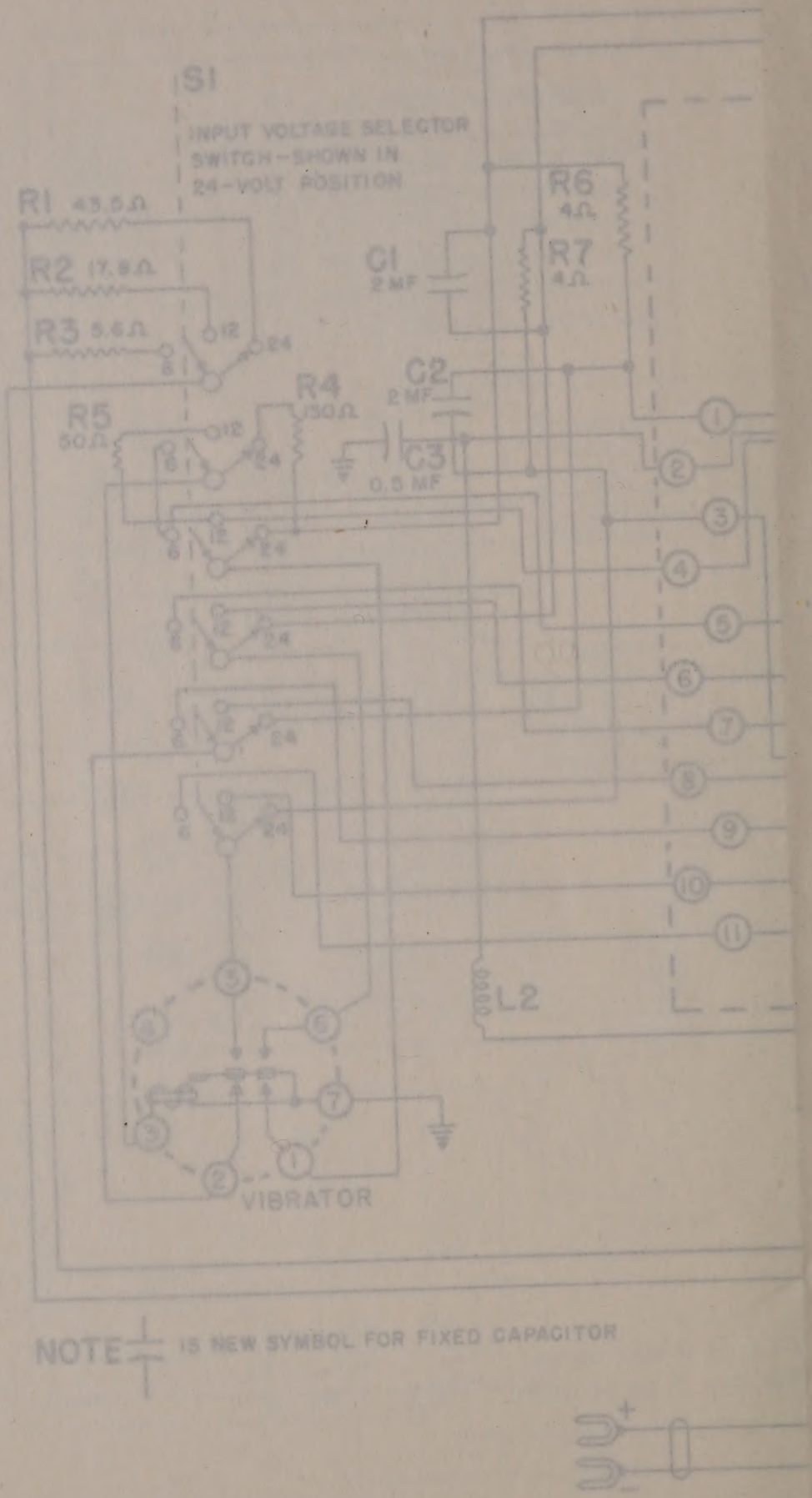
S1
INPUT VOLTAGE SELECTOR SWITCH—SHOWN IN 24-VOLT POSITION
R1 45.5Ω
R2 17.8Ω
R3 5.6Ω
R4 130Ω
R5 50Ω
R6 4Ω
R7 4Ω
C1 2 MF
C2 2 MF
C3 0.5 MF
12
24
L2
VIBRATOR
NOTE IS NEW SYMBOL FOR FIXED CAPACITOR